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THE DEPRECIATION OF GOLD.

The attention of the entire civilized world has been called of late years to the steadily increasing cost of living. Statistics have been plentiful in this country to show that the market prices not only of food and clothing but of most of the staple articles of commerce have been steadily advancing. A recent investigation of retail prices in this country by the United States Department of Labor has shown that foodstuffs have increased about 60 per cent in price over the averages for the period between 1890 and 1900. While the rise in prices of commodities in general has not been as great as this, there was between 1896 and 1912 a general increase in the neighborhood of 45 per cent. This figure is based upon prices not in this country alone but upon the international market quotations.

There have been numerous investigations into the causes of these rising prices, but it is not necessary to consider all of these causes here. One of them has certainly been the depreciation of gold. That is to say, the standard of measurement for determining values is not a fixed and constant thing, since it, like the commodities which are measured by it, is subject to the same fluctuations as they, due to variations in supply and demand. The value of all commodities is determined to a certain extent by supply and demand. The deprication of gold must be attributed to the enormous production of this metal in recent years, due largely to the opening of the Alaskan gold fields. As the increase in available gold has been no greater than the increase in population, it might seem that as long as the supply of gold per capita does not increase, the demands of commerce would be equal to the supply. Modern methods of commerce and trade, however, make less necessary than formerly a large supply of coin for business transactions, since the commercial world depends more and more upon the use of credits and bank checks for effecting transfers than upon the actual use of money.

It is of interest to consider the effect of this variation in the unit of measurement of values upon public utilities.

The regulation of public utilities by state commissions is resulting in the crystallization of the principle that the rates for public service are to be so determined that the net receipts of the operating company shall represent a fair return, and no more, upon

the capital usefully invested in the enterprise. The determination of the fair return is a matter of great difficulty, usually involving not only the determination of the percentage of the investment which shall be returned annually, but what the amount of that investment is. Since the value of this investment, or the present value of the property, is expressed in dollars, the effect of the shrinkage of the dollar upon rates of return and upon depreciation of the physical property is of great importance. In no other measurement of magnitudes is civilized man content with a unit which is less stable and unchangeable than the investigations of science permit of defining, but in the field of finance and commerce we still adhere to a unit for the measurement of values which is not only variable but subject to the most extreme fluctuations.

If we agree upon a percentage return which is appropriate at the time of investment in a utility property, the amount to be turned over to the investors during the first year is thereby fixed. If in successive years, however, this return is kept at the same number of dollars while the size of a dollar diminishes, it is equivalent to diminishing the rate of return, since the amount of commodities which may be purchased by this interest money will represent a smaller fraction of the amount of commodities used in the construction of the plant. For this reason a valuation based upon present appraisal is preferable to and more fair than one based upon original cost, since such an appraisal is based upon present unit costs. It must be remembered in this connection, however, that all investors do not receive the same treatment. If, owing to an increase in unit prices, an appraisal results in a valuation higher than the original cost, the advantage accrues only to the stockholder; whereas, the bondholders continue to receive only a definite percentage of the money denomination of their bonds. So far as the diminution of the unit of measurement of values is concerned, therefore, valuations based upon appraisal do justice only to the stockholder, and in many corporations the bondholders represent the larger portion of the total investment.

In considering depreciation of physical property, the effect of the changing unit of value will depend largely upon how the depreciation account is treated. Where it is aimed to accumulate in a depreciation fund, by the end of the useful life of a given portion of plant, a sum equal to the initial investment, obviously the return to capital account when this portion of plant is scrapped, will represent less in commodities, although the same amount of money, than the original investment. Where the depreciation fund on the other hand, is based upon the present appraisal of the plant, it will have been increased at the end of the plant life by an amount equivalent to the depreciation of the money standard, so that the latter depreciation will be automatically taken care of.

IMPROVED ELECTRICAL-EXPORT REPORTS.

On another page in this issue will be found our usual monthly report on electrical exports, this being based on the latest summary made public by the statistical division of the Bureau of Foreign and Domestic Commerce and covering in this case the month of July. The figures themselves show that the total value of electrical shipments is being well maintained, so that these comments will be confined merely to the form of the official report.

Until the fiscal year 1911-1912, the report on electrical exports was subdivided into only two classes, electrical machinery and electrical appliances. Two years ago two classes of shipments were segregated from the latter group, telegraph instruments (including also wireless apparatus) and telephones. A year ago the classification was radically changed by dropping the old machinery and appliance classes and segregating them partly into six new classes: generators, motors, fans, arc lamps, carbon-filament lamps and metal-filament lamps; the telegraph and telephone classes were retained, but the remaining electrical shipments were lumped into an "all other" class, which aggregated from about one-half to two-thirds of each month's total electrical exports.

During the past year efforts were made by this journal and other electrical interests to bring about further subdivision of the government reports, particularly by the segregation from the vague "all other" class of several lines of products that were known to figure prominently in the electrical export trade. The government authorities are to be commended for responding to these pleas, for the July figures show that with the opening of the present fiscal year four new classes have been taken out of the "all other" group; these are: batteries, insulated wire and cables, interior-wiring supplies (including also fixtures), and static transformers. The last class alone amounted to $207,314 in July, the insulated wire and cables to $147,948, and interior-wiring supplies to $68,695. The sum of these four new classes was over $468,000, and by removing them from the miscellaneous class the latter was reduced from over 67 per cent of the total electrical exports in July, 1912, to 38.8 per cent in July, 1913.

Electrical products are of such varied character that it would be impracticable to subdivide the electrical-export reports completely. Nevertheless, exporters and others, who are aware that shipments of one or more lines of products now still lumped in the "all other" group amount to a considerable sum, should call that fact to the attention of the Division of Statistics, Bureau of Foreign and Domestic Commerce, Washington, D. C. By such effort it is likely that the character of the miscellaneous electrical group may be further disclosed and its percentage of the total electrical shipments still more reduced.

It is worthy of noting again that certain exports

that may by some be regarded in the electrical class are otherwise classified. Chief among these are electric automobiles, cars and locomotives. The latter are separately listed under "engines." Electric-car shipments probably can be ascertained from the reports on "cars, passenger and freight, and parts of," which are separately given for steam railways and "for other railways," the latter being very likely almost entirely electric railways; in July these latter shipments amounted to $228,537. Automobiles, on the other hand, are subdivided only into commercial and passenger vehicles, and parts of. It would be interesting to know what part of the automobile exports, which in July totaled $2,131,103, was electrical.

FEES FOR ELECTRICAL INSPECTION.

Owing to the fire hazard of improper electric wiring it has long been the general practice of the fire insurance companies not to issue any policy upon a property containing electrical equipment until the same has been inspected and found to comply with the rules governing such installations. The rules enforced in most parts of the country are those contained in the National Electrical Code. Such inspection does not, of course, cover properties for which policies of insurance are not taken out. In order that all wiring may be inspected before using, a large number of municipalities have provided municipal inspectors and permit no electrical equipment to be put into service until it has been approved by them. This protects the occupant of the inspected premises from defective work by the electrical contractor and also protects the community in general from the hazards which might be occasioned by defective work upon individual property. It is thus in part a public function and in part a service to the individual, which it has been made compulsory upon him to accept. In some cities, however, there is no municipal inspection, but it is required that the inspectors for the fire insurance bureaus shall inspect all installations.

As to the charge that should be made for such inspection, there seems to be a wide difference of opinion. Where all inspection is in the hands of a private bureau, fees are quite naturally charged which are of an amount sufficient to more than pay the expenses of carrying on the work. The same is true in some cases of municipal inspection; whereas in others the city makes no charge whatever for such work, giving the predominance in the formulation of its policy to the public character of the function which it is exercising. This lack of uniformity will be evident by reference to an article upon the subject upon another page of this issue, where a collection of figures is given from a number of cities scattered over the country. The two largest cities of the country are notable examples of the two extremes. In New York City there are no fees for inspection; whereas in Chicago fees are charged of such magnitude as to not only cover the expenses of the work but to yield a surplus to the public treasury. In some other cities small fees are charged which are, however, of a somewhat nominal nature and are not sufficient to pay the expenses of the city department concerned. In still others, this work is not conducted by a separate department but by employees who have other duties as well and the expenses are not easily segregated.

One's opinion as to the correct policy in fixing fees for inspection will depend upon one's idea as to the proper function of the city government in undertaking such control of electrical installations. On the one hand it may seem proper to have no fees whatever for this work and on the other it may seem appropriate to make such charges as will cover or partly cover the expenses of maintaining the inspection department. It would be hard to find any justification, however, for a system which brings into the city treasury more money than is expended in maintaining the department. In such a case the surplus is nothing more than a tax upon the industry, which is thereby being required to supply funds for some other municipal activity to which it is in no way related. Such a burden, even though it be small, can have no other effect than to increase the cost of electrical work and thus tend to retard the development of the industry.

WELFARE WORK.

One of the important subjects considered at the recent convention of the Pennsylvania Electric Association was that of the relationship between company and employee in general, and welfare work in particular. Not only all the operating electric light and power companies, but all public-service corporations and individual operators in their particular lines of manufacture are realizing that the efficiency of work done can best be brought about by protecting the employees from all injury, even to protecting the very source of an injury. It is a fact, and one worthy of note, that electric light companies of this country were and are foremost in the work to protect, uplift and take into earnest consideration the comfort and safety of their employees. It should be gratifying to central stations to know that the protection of employees' interests is a movement for which they can take credit and of which they may justly feel proud. Several papers were presented dealing with various phases of welfare work, describing specific rules to be followed by employees in the course of their work in all branches of the central-station field. It is inevitable that the National and State Governments will ultimately take action to protect employees, and by gradually anticipating this legislation, by properly safeguarding against accidents and compensating for injury and disability, central-station companies can save considerable money and annoyance incident to the enforcement of these laws.

Electrical Exports for July.

The Bureau of Foreign and Domestic Commerce, Washington, D. C., has issued its monthly summary of the imports and exports of the United States for last July. From these statistics are obtained the following data on the exports of electrical products for that month.

A modified classification of the electrical exports has been adopted in the government reports by adding four new classes formerly included in the "all other" group. The new classes are: batteries; insulated wire and cables; interior wiring supplies, etc. (including fixtures); static transformers. The actual numbers of articles shipped in each class is given in the report for only four classes, these being for July, 1913, as follows: electric fans, 3,262; arc lamps, 874; carbon-filament lamps, 133,705; metal-filament lamps, 91,796.

The total value of the electrical exports was about 20 per cent greater for last July than for the same month in 1912. The total was also a trifle greater than for last June, although considerably below the extraordinary record established last May.

In the following table are given the detailed figures for last July and also for the corresponding month of a year ago, as far as the detailed figures for the latter are available.

Articles.	July, 1913.	July, 1912.
Batteries	$ 44,084	.....
Dynamos and generators	246,595	$ 184,841
Fans	40,217	40,438
Insulated wire and cables	147,948	.....
Interior-wiring supplies, etc. (including fixtures)	68,695	.....
Lamps—		
Arc	16,423	9,307
Carbon-filament	22,582	15,120
Metal-filament	30,847	26,609
Motors	501,783	203,262
Static transformers	207,314	.....
Telegraph instruments (including wireless apparatus)	3,402	39,559
Telephones	77,969	113,626
All other	901,643	1,299,857
Total	$2,318,502	$1,932,619

Industrial Welfare and Efficiency Convention to be Held in Pennsylvania.

A unique convention, believed to be the first of its kind as yet proposed, will be held in the State Capitol Building of Pennsylvania at Harrisburg, on October 28 to 30. This conference is called by the State Department of Labor and Industry, and is to be under the immediate auspices of the Engineers' Society of Pennsylvania. The conference is called for the specific purpose of determining in what manner the industries of the state can cooperate with the department named and other of the state departments with the aim of improving the economy of production and the quality of products.

One of the important methods of doing this is believed to be by improving the skill and physical capacity of the workers themselves, and by reducing factors which cause irregularity in their times of employment. The Pennsylvania Department of Labor and Industry has been particularly organized to aid in promoting this work by pointing out methods for bettering sanitary conditions, safety and other conditions of labor. Another important way in which it is aimed to avoid much loss is by a more sane and dependable way of settling disputes between employers and employees than by strikes and lockouts. Other features that bear directly upon this matter are the proper development of vocational education, improvement in methods of compensation, workmen's savings banks, safety organizations, etc.

The conference is to be of a strictly business character. Representatives of industrial establishments, of insurance and other companies, and all others who may be interested in this general subject are invited to attend this conference and participate actively in the proceedings. The first day of the conference will be given up to a general discussion of the subject and to a study of what a number of the most interested state departments can do on behalf of the industries. Governor John K. Tener of Pennsylvania, who heartily approves of the movement, has indicated that he will join in the deliberations of the first day. The second day is to be devoted more specifically to labor conditions and their improvement, from the standpoint of both employer and employee. The third day will be given up to a study of accidents and fires and their prevention.

An excellent exhibit of the latest and best types of machinery and other industrial apparatus is being installed in a large concrete building made available by the Harrisburg Railway Company, and containing 26,000 square feet of floor space. This exhibit will probably prove of material value as a practical illustration of efficiency and safety methods. Paul Gendell, of the Engineers' Society of Pennsylvania, Harrisburg, Pa., is the director of exhibits.

George S. Comstock, president of the Engineers' Society of Pennsylvania, has been asked to preside over the conference. John Price Jackson, commissioner of the Department of Labor and Industry, Harrisburg, is chairman of the Program Committee. Other members of the General Committee are F. H. Snow, of the Pennsylvania Department of Health; J. V. W. Reynders, of the Pennsylvania Steel Company; Spencer C. Gilbert, of H. Gilbert & Son.

The Jovian Campaign to Assist the Society for Electrical Development.

The Jovian campaign to secure subscriptions for the Society for Electrical Development, in compliance with the resolution recently passed by the eleventh congress of the Jovian Order at its meeting at Niagara Falls, is progressing satisfactorily, some 45 Jovian Leagues having reported to the central office indicating their interest in the work and determination to win the prizes offered by the Society.

Through the courtesy of Edwards & Company, of New York City, the services of Thomas H. Bibber, Jovian statesman-at-large, have been loaned to the Jovian central office for a period from September 15 to October 1. Statesman-at-Large Bibber will assist Eleventh Mercury E. C. Bennett in the work of managing the campaign for the Society. Mr. Bibber's large acquaintance among the electrical fraternity, his host of friends and his long activity as an enthusiastic and efficient Jovian worker make his services of inestimable value in this important campaign which the Jovian Order has undertaken.

Memorial to Wireless Operators.

A classic fountain is to be placed near the new Barge Office in New York City as a memorial to four wireless operators who lost their lives at sea while on duty. These are Jack Phillips, of the *Titanic;* George C. Eccles, of the *Ohio;* Stephen F. Sezepanck, of the *Pere Marquette;* and Lawrence A. Prudhont, of the *Rosecrans.*

The memorial will contain the following inscription: "Erected In Memory of Wireless Operators Lost At Sea At the Post of Duty."

Great Increase in Telephones in Canada.

The Canadian Government telephone authorities announce that there are now in use in Canada about 400,000 telephones, compared with 200,000 reported a year ago; this averages one telephone for every 19 persons in the Dominion. The total length of telephone wires in use is nearly a million miles, an increase of about 200,000 miles during the year. Statistical returns were made by 683 companies, compared with 537 in 1912, it is stated.

Electric Club Resumes Meetings.

The Electric Club, of Chicago, held the first meeting of the season 1913-1914 on September 18 at the Hotel Sherman. The customary luncheon meeting was held with some special entertainment features. J. G. Pomeroy, a visitor to the city and former member of the Club, was called upon for a few remarks.

A. M. Schoen.

The present universal popularity of electricity as a convenient and efficient form of energy is in a very large measure due to the splendid accomplishments of the last fifteen years or so in the field of electrical inspection, and to the good work that is now going on there. A form of energy the use of which was attended with any considerable danger could hardly become very popular; for the fact that the hazard of electric service is generally a quantity that is almost negligibly small the electrical inspector and the men who have worked out construction rules for him are mainly to be thanked. Prominent among the men who have accomplished most in the field of inspection is A. M. Schoen, of Atlanta, Ga. Although still a young man, Mr. Schoen was one of the pioneers in this field.

A. M. Schoen,
Electrical Engineer, South-Eastern Underwriters' Association.

A. M. Schoen was born in Richmond, Va., in 1869, and was graduated from the Virginia Military Institute when he was twenty years old. At the Institute he paid particular attention to the study of mathematics and civil engineering, and for a time after leaving school he followed civil engineering as a profession, being engaged in railroad construction in the South. It occurred to him, however, that there were better opportunities in electrical engineering, and so he took up the study of that subject. In 1892 he was engaged as an electrical expert at the Lynn (Mass.) factory of the Thompson-Houston Electric Company. Later on he took up central-station work in the South, and became assistant superintendent of the Richmond (Va.) Railway & Electric Company. This position he resigned to become electrical inspector for the South-Eastern Underwriters' Association, with headquarters in Atlanta. The field of this association is so large that he felt that this new position would give him an acquaintanceship in the South that would prove valuable to him in consulting engineering, which profession he expected finally to enter. However, finding the work increasingly constructive, he continued with the Association, becoming chief electrician and chief engineer, successively, as these offices were created. At the same time, he has been practicing consulting engineering as much as the duties of his place with the Association will permit. He has had a number of the larger corporations and cities of the South for his clients.

Mr. Schoen is a Fellow in the American Institute of Electrical Engineers, having become an associate in the organization ten years ago, and having been promoted to the grade of member not long thereafter. At one time he was one of the Institute managers, and he has served on various important committees of this body. He is the chairman of the Atlanta section of the organization now, which position he has been filling for several years. He is also chairman of the executive committee of the Affiliated Atlanta Sections of the National Engineering Societies. In 1894 he became a member of the Electrical Committee of the Underwriters' National Electrical Association, which formulated the National Electrical Code. He has been a leading member of the Code committee ever since then.

Mr. Schoen's work as an author has not been inconsiderable. A late book of his is his Manual of Electricity, a volume that is now becoming one of the very popular contributions to electrotechnical literature.

To folks who know Mr. Schoen personally and are acquainted with his methods of doing things he appears to be a man of pleasing, unobtrusive demeanor, whose philosophy is that, while every man should strive constantly towards large accomplishments, the smallest task that is worth doing at all is worth doing well. He is a man who knows the meaning of opportunity and duty, and is a gentleman whom it is a pleasure to know.

International Congress of Refrigeration.

The third International Congress of Refrigeration was opened in Washington, D. C., on September 15, and was attended by delegates from all parts of the world. The delegates then traveled to Chicago, where sessions for the reading of papers were held at the La Salle Hotel, September 17 to 24. At the same time an International Refrigeration Exposition, to remain open until October 1, was held at the International Amphitheater, Chicago.

The Congress was divided into six sections, with presidents as follows: (1) Liquefied Gases and Units—William Kent; (2) Refrigeration Machinery and Insulating Materials—Alexander C. Humphreys; (3) Application of Refrigeration to Food—Harvey W. Wiley; (4) Industrial Refrigeration—M. L. Holman; (5) Railroad and Steamship Refrigeration—W. C. Brown; (6) Legislation—James R. Mann.

The secretary of Section I was Calvin W. Rice. Among those registered were Georges Claude, of France, inventor of the neon tube lamp; Friedrich Linde, of Munich, Germany; John W. Lieb, Jr., of the New York Edison Company; C. H. Stevens, of the Brooklyn Edison Company. The last named presented a paper entitled "Artificial Ice Making and Refrigeration from the Standpoint of Central Station." The contents of this paper will be presented in a later issue.

New Italian Electric Plant.

The Società Sicula Imprese Elettriche, of Palermo, Italy, the largest company producing electric energy for lighting and traction purposes in that city, has just completed plans for the electric lighting of all the principal towns and villages in the Province of Palermo.

A new power house with machinery developing 5,000 horsepower, which it is proposed gradually to increase to 10,000 horsepower, will be constructed in one of the suburbs of Palermo, it is announced.

Illinois Commission Revises Overhead Power Line Crossing Rules.

The Illinois Railroad & Warehouse Commission as a result of hearings on fourteen petitions, five coming from the Aurora, Elgin & Chicago Railroad and nine from the Chicago, Milwaukee & St. Paul Railway, a steam railroad, to cross other steam roads with overhead high-tension transmission lines, has decided to revise its rules governing the installation of telegraph, telephone and power lines over the right-of-way of railroad companies. The revised rules will conform to the specifications adopted by the joint committees for overhead crossings of light power lines. The Aurora, Elgin & Chicago Railroad, in filing its petitions, claimed that it had conformed to the specifications adopted by the joint committee for overhead crossings of light and power lines and had provided an overhead clearance of 30 feet. The rules of the Illinois Railroad & Warehouse Commission for overhead line crossings provide for an overhead clearance of 35 feet. On September 4, the members of the Commission heard the appeal of the companies and agreed to issue an order for each of the fourteen crossings if both the Aurora, Elgin & Chicago Railroad and the Chicago, Milwaukee & St. Paul Railway conformed to the joint specifications. The engineers for the Railroad & Warehouse Commission will begin at once to revise these rules, using as a basis the specifications adopted by the joint committee.

Record for New York Edison Trouble Crew.

Few people know how near there came to being a serious break in the schedule of receiving and conveying to land from the Cunard steamer *Lusitania* the body of the late Mayor Gaynor, early on the morning of Friday, September 19. The plans were that the steamboat *Correction* of the Department of Charities should meet the *Lusitania* at Quarantine and convey the remains to Pier A. The *Correction* was being held in readiness at Thirty-fifth Street and the North River, when at about 1 a. m. every light went out, leaving the boat in darkness. It was discovered that the generating apparatus had become disabled. Electricians were needed instantly, and at that hour in the morning the only force available was the night crew of the New York Edison Company, to which Commissioner Driscoll telephoned for aid.

Upon the arrival of the emergency men from the Edison Company it was found that the commutator of the *Correction's* generator had been short circuited. Repairs were accomplished so speedily that by 3 a. m. the *Correction* was on her way down the bay to meet the *Lusitania*.

Electrical Improvements for the Port of London, England.

It is announced that the Port of London Authority will send its chief engineer and one of his assistants to America for the purpose of securing information which will enable the installation of the most modern and efficient conveyor plant for the new cold storage and sorting sheds at the Royal Albert Dock. The object of the Port of London Authority is to provide for the most rapid transit of frozen and chilled produce from steamers and to prevent its undue handling or exposure.

Electricity will be substituted for steam at the existing cold-storage plant at West Smithfield and arrangements have been perfected for furnishing a supply of electric current both to this cold storage and to the new cold storage under construction. Through the extension work which is now in progress at Tilbury (about 23 miles from London), 1,612 linear feet will be added to the south quay of the main dock. It is proposed to equip this extension with 12 electric luffing cranes which will have a radius of operation of 60 feet and a lifting capacity of 3,360 pounds, with gear to admit of lifting three tons at a slower speed. The power station at Tilbury Dock will be increased to meet the additional demand for current. Railway lines will be built in connection with the three new transit sheds, each 600 feet by 120 feet, which form part of the extension scheme.

Hydroelectric Plant for Paper Mill.

At Grand Falls, about 12 miles from St. Stephen, N. B., on the St. Croix River, the St. Croix Paper Company, an American concern, is building a large concrete dam across the river for the purpose of generating electric power for its mills at Woodland, Me. The dam will be about 1,100 feet long and 45 feet deep at the deepest part, and it is estimated that 12,000 horsepower will be generated.

Electrical Metal-Mine Accidents.

In the metal mines of the United States there were 695 men killed; 4,169 seriously injured and 22,408 slightly injured in 1911, the last year for which the statistics are complete. Of these, 15 or 2 per cent were killed by electric shock or burns underground and 2 at the surface. Of those seriously injured 7 or 0.16 per cent were due to the same cause; and of those slightly injured, 61 or 0.27 per cent.

Jovian League of Southern California.

The Jovian Electrical League of Southern California holds meetings every Wednesday at 12:15 p. m. at Christophers, 551 South Broadway, Los Angeles.

Electrical Goods Displayed in Pittsburgh.

The electrical world is getting a goodly share of advertising during the celebration of the one hundred and twenty-fifth birthday anniversary of Allegheny County, the celebration of which took place in Pittsburgh, September 22 to 27. The 10 large display windows of the McCreery Company department store are given over to displays of "Made-In-Pittsburgh" goods, and electrical materials, therefore, take first rank.

The entire Wood Street front of the store, as well as the show windows on Sixth Avenue side, are given over to displays other than those of the store. The windows in Wood Street extend the length of the entire block, from Sixth Avenue to Oliver.

Those companies which have exhibits are: Westinghouse Electric & Manufacturing Company, small motors and household electrical goods; Standard Underground Cable Company, insulated wires and electrical appliances; Standard Sanitary Manufacturing Company, bath room fixtures, including electric lighting; Pittsburgh Lamp, Brass & Glass Company, electric lamps and other glass ware; Conroy-Prugh Company, electric lamps and glass ware; Pittsburgh Plate Glass Company; Macbeth-Evans Glass Company; lamps of all kinds; W. W. Lawrence Company, paints and interior decorations; Pennsylvania Rubber Company, automobile tires and other rubber goods; Monongahela River Consolidated Coal and Coke Company, model of the steamer Sprague with tow of 56 barges and coal boats; Youghiogheny Coal Company; Harbison-Walker Refractories and the Hay Walker Company, bricks; Pittsburgh Screw and Bolt Company; the Graff Company, stoves and ranges, and the Armstrong Cork Company.

Home for Disabled Electricians.

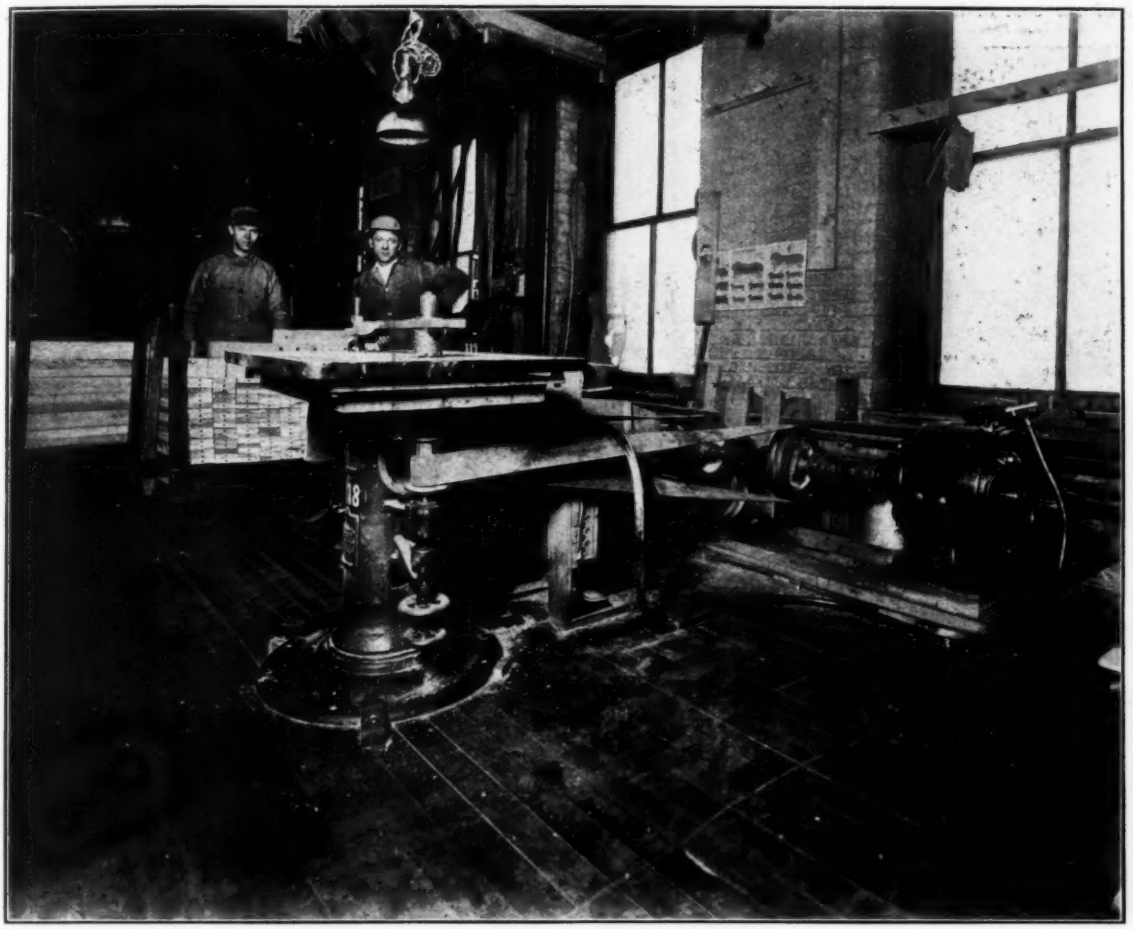
A proposition to establish a home for disabled members was the most important subject discussed at the sessions of the International Convention of the Brotherhood of Electrical Workers, held in Boston, Mass., September 19. A resolution for devising means to realize the project was introduced by Ray McEhaley, of Chicago, and was almost unanimously approved. Committees from the several sections of the country will be named to work out recommendations to the next general convention.

A 50 years' concession has been granted to Marconi wireless interests for radiotelegraphic connection of Rio de Janeiro and other Brazilian cities and Europe.

Electricity in Automobile Manufacturing—II.

The conditions regarding the application of motor drive and central-station power to plants manufacturing automobile bodies do not differ materially from other woodworking establishments. The disposal of refuse is one of the important considerations. Data on such plants are given in this article.

As was pointed out in our last issue, the operations involved in manufacturing automobiles may roughly be divided into two classes: machine-shop work and woodworking. This article will deal principally with the woodworking end of the business—plants manufacturing bodies. In accessory plants, manufacturing horns, windshields, radiators, etc., the problems to be met with in applying motor drive will usually be a combination of those involved in either machine-shop or woodworking practice.



An Example of Individual Motor Drive in a Body Factory.

From the standpoint of the central-station company, plants devoted to the manufacture of automobile bodies do not differ materially from other woodworking establishments. Wood refuse, varying in amount with the size of the plant, is available for fuel, and as the coal bill is often a small item of the plant's total operating cost, where this refuse is burned, the plant manager usually feels that no economy can be effected by purchasing power. In soliciting the adoption of electric drive for such plants, therefore, a great proportion of success depends upon the ability of the central-station salesman to correctly analyze existing operating expenses and fixed charges.

It is true that the ability of the central-station company to furnish energy to automobile factories—in which wood-working is done—at an attractive figure depends, to a large extent, upon the proper utilization of the waste. Experience of innumerable plants in this connection have shown that a ready market can be found for all waste, selling both kindling and baled shavings, and where the income from this is not sufficient to pay for the entire amount of power purchased from the central station, it reduces power bills to such an extent that the cost of steam power in comparison is out of the question. Of course, the demand for waste varies in different localities, but some market can be found in the great majority of instances.

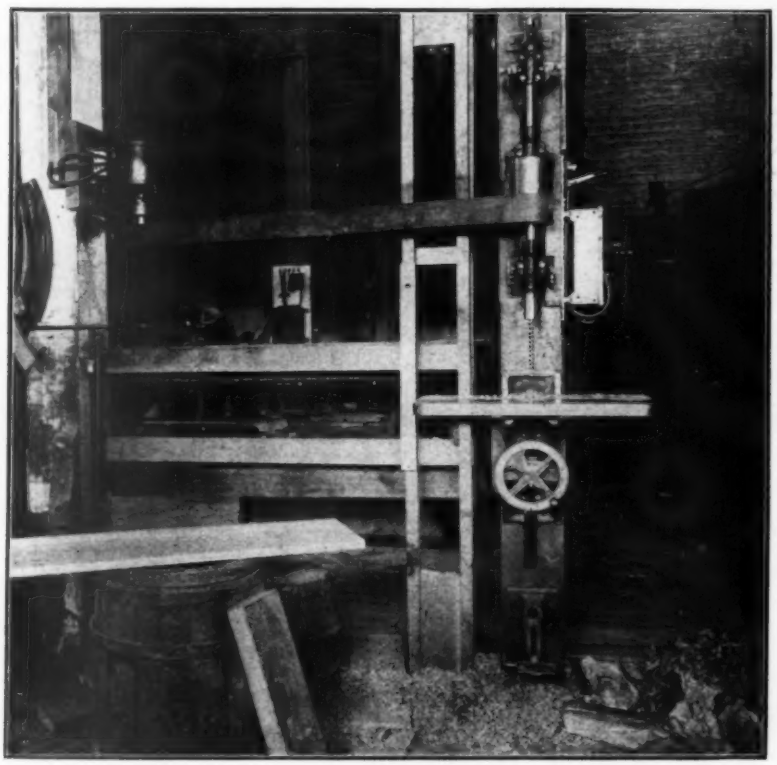
Much has been written, also, regarding the distillation of wood. One writer estimates that from one cord of hard wood, weighing 4,000 pounds, the following products can be obtained:

	Market Value
Charcoal, 42 bushels; per bushel	$0.05
Wood alcohol, 10 gallons; per gallon	0.25
Acetate of lime, 200 pounds; per pound	0.015
Tar oils, 8 gallons; per gallon	0.08

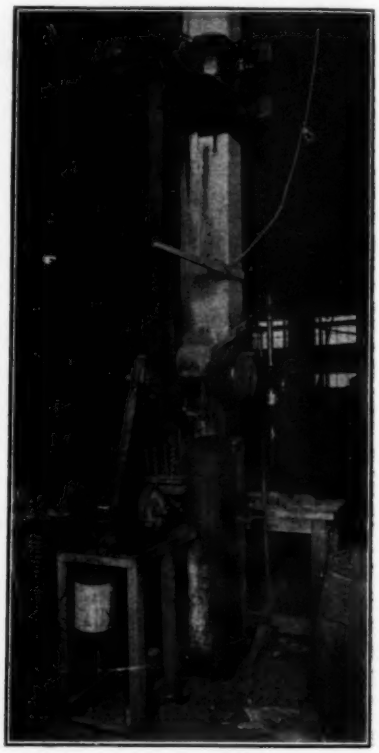
On this basis the average money return per cord is $8.24 against which

the distiller is at the present time paying from $3.50 to $3.75 a cord for material.

It would seem from the above figures, which are conservative, that the field is there waiting for exploitation. This, indeed, has been proven by a steady increase in the number of distillation plants and the establishment of plants at places where cheap refuse is available. At the present writing a plant is being equipped at Memphis, Tenn., designed to accomplish this very thing. The question whether the waste of the woodworking industry of the future will be of more value than that of the past will depend upon the relation of the cost of handling this miscellaneous material through the processes which give it this increased value.



5-Horsepower Motor Driving Vertical Boring Mill.



1.5-Horsepower Motor Driving Double Emery Wheel.

Advantages of Motor Drive.

There are a great many advantages of motor drive that apply to all woodworking plants and therefore are of importance when considering the electrification of automobile body shops. A few of the more important ones are discussed herewith. In the majority of plants the equipment is usually the same as that found in any woodworking establishment, with the addition of a forge and machine shop for manufacturing the metal parts used in the construction of automobiles.

The ideal attainment of modern production is a maximum output from a given investment in plant and machinery. Electric power, in so far as it contributes to this result, is being given an ever-increasing degree of attention where woodworking machinery is used, as experience under the severest service conditions has proven that it possesses advantages of efficiency and economy that meet most successfully the peculiar conditions of the woodworking industries. It has been demonstrated under the severest service conditions that the electric motor renders possible the most economical approach to the direct application at the machine of the total initial power developed. Also, the better lighting and ventilation, the greater freedom from dust and lessened danger of physical injury, resulting from the removal of belts and shafting, have been found by experience to increase the productive efficiency of the employee.

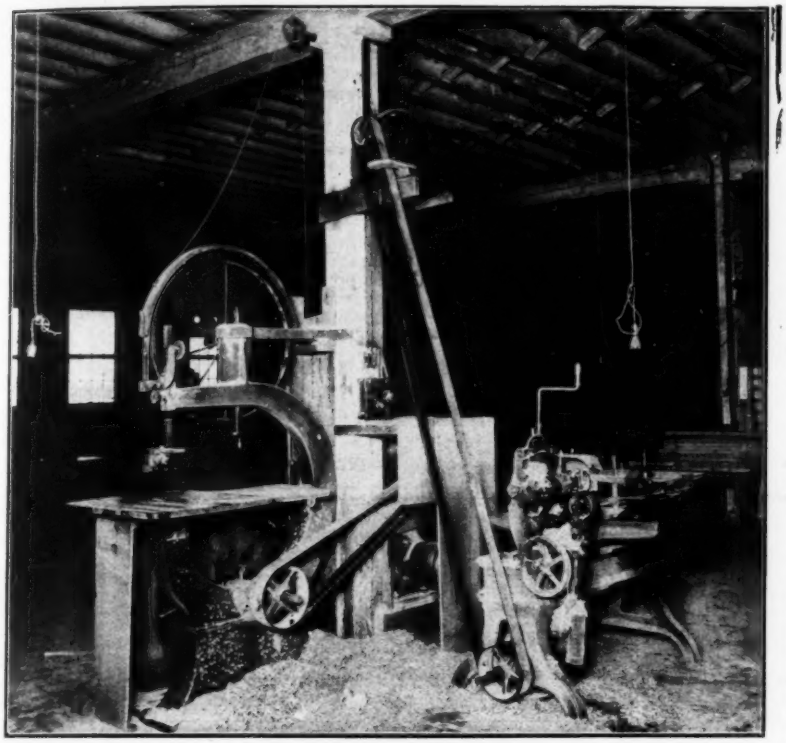
An important feature of individual motor drive is the ability to operate any group of machines or any separate machine overtime or at unusual hours without putting the entire plant in operation. This feature is, of course, of especial importance when energy is supplied by a central station, as in that case the cost of operating any machine stops when the machine does.

The space economy of individual motor drive is also of particular importance in carriage and wagon works due to the size of the product handled. When machines can be placed regardless of lineshafts utilization can be made of the available floor space to the best advantage.

One of the important arguments to be remembered by the central-station power salesman is the marked reduction in fire risk where central-station power is used. If power is obtained from an adjacent steam plant the fire risk is great and insurance rates correspondingly high. Mechanical drive necessitates either the dangerous proximity of the boiler room or heavy losses in long steam mains or rope transmission. If central-station power is used, all danger from adjoining power plant is removed; in any case, electric drive not only does away with the inflammable dust inevitably carried into the engine room by the large belt, but also makes possible the complete isolation of engine and boiler.

Selection of Motors.

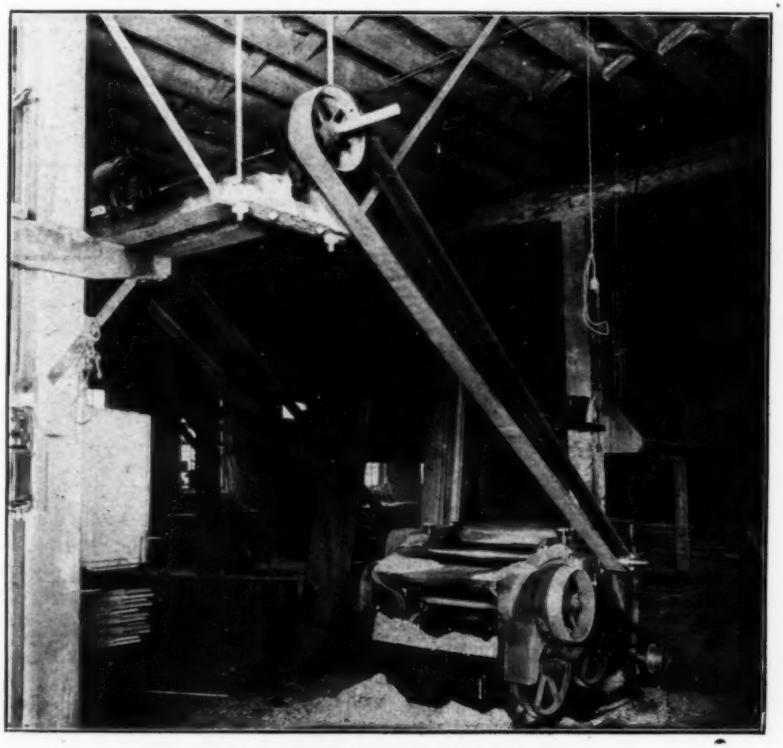
The selection of motors for service in the body department of automobile factories presents no especial difficulty. In general, the requirements can be met successfully by constant-speed motors, and preference should be given the simple squirrel-cage type of induction motor, as the working conditions in body shops permit the motors to be



Two Individually Driven Machines in Body Plant.

started, in most cases, under light loads. Any demand for variable speed can be met by one of the several forms of pole-changing multi-speed induction motors which are now available.

Owing to the high speed and light moving parts of woodworking machines, and the frequent violent application of the load, it is desirable to use belt drive rather than gears or chains,



7.5-Horsepower Motor Driving Planer.

especially as the speed of the driven pulley is usually too high to permit of other than direct or belted connection.

The direct drive is coming into vogue in many modern plants and giving excellent results, where the motor has sufficiently generous rating to accelerate rapidly and to withstand overloads. As the average depression of belting averages 36 per cent per year, it is important to reduce this waste, and furthermore, do away with any source of slippage between the driving unit and the working pulley.

In the installation of motors in automobile factories, if belts are used, it is strongly recommended that they do not run vertically or have so decided a vertical component as to minimize the arc of contact on the driving pulley and at the same time prevent the use of the belt-tension adjustment on the motor base. Motors may often be conveniently located in an inverted position beneath the floor bearing the machine. If this method is adopted the belt between the motor and machine should be boxed in and the drive arranged as above stated, at a sufficient angle to be able to make use of the belt-tightener arrangement. There is a wide opportunity for the power salesman to use his ingenuity in the layout of novel methods of drive.

Cost Data.

No better illustration can be given of the advantages and economies of electric drive than in cases where it forces competing motive powers out of business in the face of unusually low fuel costs. In this connection the following particulars are given of the successful introduction of central-station power in a representative body factory, the adoption of electricity having been effected on the basis of a lower operating cost per year than the original steam plant, even when refuse sawdust and shavings were burned under the boilers.

The local central-station organization in this particular case pointed out that the ideal arrangement for the use of electric energy is a separate motor for each machine, but suggested that when the energy saving by this method ceases to pay 15 per cent on the investment it is not a success from a strictly financial point of view, although the cleanliness, convenience and flexibility of such an installation sometimes make it more desirable.

An analysis of the conditions prevailing under steam operation were found to be as follows:

	Horsepower
Maximum load on day of test	20
Average total load on day of test	8.8
Friction load on day of test	5.5
Average total productive load on day of test	3.3

The average total productive load if the machines had been fully loaded

Automobile Manufacturing Data.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Automobile Plant. This plant manufactures automobile and wagon bodies, operating 56 hours per week. Total connected horsepower, 12.5. Total number of motors installed, 2. Average kilowatt-hours per month, 524. Average kilowatt-hours per month per connected-horsepower, 42. Load-factor, 9 per cent.

Kilowatt-hour consumption for 21 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	590	May	524	September	570
February	486	June	638	October	446
March	472	July	690	November	516
April	478	August	500	December	398

Motor Installation.

The following is a list of the motors installed with their respective drives. The supply source is 220 volts, direct current.

No.	Horse-power.	Speed R. P. M.	Application.
1	7.5	1,625	Belted to a line shaft driving one small drill press; one trip hammer; one two-spindle emery wheel; one small punch, and one forge blower.
1	5	1,650	Belted direct to one cut-off saw.

Automobile factory, manufacturing, principally, light delivery-wagon bodies.

Total connected horsepower, 57.5. Total number of motors installed, 22. Average kilowatt-hours per month, 3,295. Load-factor, 12 per cent.

Kilowatt-hour consumption for 21 months: January, 4,750; February, 2,440; March, 3,130; April, 3,220; May, 3,170; June, 3,100; July, 2,830; August, 2,750; September, 2,670; October, 4,700; November, 3,750; December, 3,030.

Motor Installation.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	7.5	800	Belted direct to elevator.
1	2	1,650	Belted to emery grinder.
2	2	1,100	Each belted direct to trip hammer.
4	0.5	500	Belted direct to small drill presses.
1	3.5	1,600	Belted to shafting driving punch and shears.
1	3.5	1,600	Belted direct to shaper.
1	2	1,650	Belted direct to cut-off swing saw.
1	2	1,600	Belted direct to tenoning machine.
1	2	1,500	Belted direct to sander.
1	3.5	1,600	Belted direct to planer.
1	2	1,650	Belted direct to boring machine.
1	1	740	Belted direct to thread cutter.
1	7.5	830	Belted direct to hydraulic press.
1	2	1,600	Belted direct to band saw.
1	3.5	1,650	Belted direct to rip saw.
1	3.5	1,650	Belted direct to jointer.
1	5	900	Belted direct to hub-boring machine.
1	1	1,000	Belted direct to tire-bending machine.

Energy is supplied by the Commonwealth Edison Company.

Body works. There are eight men employed working 10 hours per day.

Total connected horsepower, 30.5. Total number of motors installed, 15. Average kilowatt-hours per month, 496. Load-factor, 3 per cent; operating-time load-factor, 7 per cent.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	495	May	476	September	438
February	682	June	457	October	439
March	584	July	415	November	601
April	476	August	383	December	505

Motor Installation.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power.	Speed R. P. M.	Application.
1	2	1,700	Belted to a J. A. Fay & Egan jig mortiser with drill attachment.
1	1	1,700	Belted direct to 36-inch drum sander.
1	0.5	1,800	Belted to 12-inch double emery wheel.
1	1	1,700	Belted to L. Powers & Company No. 0 boring machine.
1	2	1,700	Belted to L. Powers & Company 20-inch jointer.
1	5	1,700	Belted to H. B. Smith 24-inch planer.
1	3	1,700	Belted to 48-inch band saw.
1	5	1,200	Belted to 18-inch self-feed rip saw.
1	1	1,700	Belted direct to 16-inch drill press.
1	1	1,700	Belted to 12-inch double emery wheel.
1	1	1,700	Belted to small shear and punch.
1	2	1,700	Belted to 4 by 7-inch roll-tire bender.
1	1	1,700	Belted to 26-inch drill press.
1	2	1,700	Belted to 800-pound Giant trip hammer.
1	3	1,700	Belted to No. 2 Buffalo forge blower.

during the entire time on the test, not including the 5.5 horsepower of friction would have been 7.96 horsepower. This figure was used in the cost estimates which drove the steam engine from the plant, rather than the actual average productive load. From the records of the company the following yearly costs of steam power were reduced for two successive years: first year, $1,176; second year, $1,366, giving an average of $1,271, or $106 per month. The principal items were coal, averaging $600 per year, and engineer's wages, average, $526 per year, other small items being oil, waste packing, engine repairs and miscellaneous. None of these small items exceeded $40 per year individually.

The motors in this plant were arranged as follows:

	Horsepower	R. P. M.
First Floor—Individual Drive—		
Rip Saw	5	1700
Planer	10	1700
Sticker, 12-inch	10	1700
Swing saw	3	1700
Second Floor—Individual Drive—		
Planer	7.5	1700
Sticker, 6-inch	5	1700
Rip saw	5	1700
Joiner	3	1700
Dado saw	3	1700
Band saw	3	1120
Group Drive—		
Tenoner, mortiser	5	1700
Sander, emery wheel, grindstone	5	1700

All motors are three-phase, 60-cycle, induction machines.

The average load used in the estimated cost of electric service was based on the supposition that all machines not used during the day of test were operated at their maximum capacity for the entire time that the machines were in service, as the machines were only operating under a maximum load for approximately 50 per cent of the time that they were in operation. A large amount of saving was apparent in the estimated cost of electrical service.

The average load of 7.96 horsepower hours per day with 26 days' service per month was 1,240 kilowatt-hours and at 4.6 cents per kilowatt-hour the energy cost was $57.10 per month, to which was added oil at $1.50, so that the total yearly cost of electrical operation was $703, compared with $1,271 for steam. The estimated saving by the use of electricity was, therefore, $568 per year, and this led to the installation of the motor drive as indicated above.

The old steam plant was given additional advantages in determining the relative yearly cost of operation, and still electricity was shown to be preferable. Thus the electrical costs were figured upon a total operation of 312 days per year against an actual service by the old steam plant of 256 days. The average number of workman-hours with steam drive was 24.5 per day, while with electricity this came to 36. The estimated cost of motors was $1,219 installed, the cost of placing the motors at the mill door being $1,080, material to be used in the installation work $108, and the labor of wiring, $31.

The installation of the electric drive resulted in the elimination of the main shaft and three auxiliary lines of shafting, besides cutting out 15 belts of varying length and sizes. The results of the first year's operation were as follows:

Total cost of energy	$419
Maximum bill of any month	$ 55
Maximum kilowatt-hours for any month	920
Minimum bill for any month	$ 33
Minimum kilowatt-hours for any month	220
Maximum demand	16.5 horsepower

In the accompanying data sheets will be found the detailed motor layout of several typical installations showing the horsepower required for various drives and the energy consumed.

Commercial Practice
Management, Rates, New Business

THE RELATION OF THE CENTRAL STATION TO ITS CUSTOMERS.[1]

By J. T. Shannon.

This is an age of concentrated effort, having as its ultimate aim "Maximum Efficiency." We have heard efficiency literally preached in every phase of business for the last few years. Electrical manufacturers have concentrated upon the efficiency of apparatus, central stations upon the efficiency of operation, distribution and accounting. We should be glad of all these things, of the wonderful strides that have been made by each, and of the co-operation that exists between the different branches of the electrical business. It would seem that, in so far as the electrical apparatus and central-station operation and distribution are concerned, the maximum efficiency is placed before us and we can truly say to its inventors and developers, "Well done, thou good and faithful servants."

I believe that the next 20 years are going to require equally as much brain work and development in the commercial end of our business as has been required during the past 20 years in the development of the engineering end. Before such great progress can be made in the commercial field, however, the confidence of the public must be won. There is at the present time too much misunderstanding of our business.

The object of this paper is to point out what seems to the writer to be some of the causes of misunderstanding, and suggest certain things that may be done to promote better feeling.

The first and most persistent cause of trouble and misunderstanding is the type of employee some central stations tolerate A large per cent of the trouble of any public-service corporation is caused by the indifference, insolence, or desire to be "Smart" of some irresponsible employee, who really has no business in such an organization.

Before you can have a 100 point service to the public, you must first concentrate upon the selection of the employee for the job, from office boy to general manager. The man should fit the job and job fit the man. How many central stations employ ignorant, careless, slovenly-dressed meter readers? In serving 5,000 customers, 5,000 meters are read each month by this class of men, meaning 5,000 bad impressions upon the minds of your customers. The trouble man, inspector, collector, cashier and clerk deserve careful selection.

A good clear complexion cannot be obtained by the use of cosmetics. The trouble is internal—not external. So before you can impress the public and your customer that you are really trying to please and properly serve them, it is necessary to get right on the inside before they will accept this fact. We have all seen the beautiful exterior of the large commodious quarters of some central-station offices, and then stepped inside and been greeted by an atmosphere of indifference. Do you remember the impression that was

1 From a paper presented at convention of the New England Section, N. E. L. A., Burlington, Vt., September 17-19.

made on your mind? Did you walk around the town and note the poorly lighted stores and abundance of gas arcs? Did you hear what Mr. Merchant said when you mentioned the lighting company's name? It confirmed your impression, didn't it? And so it is. Get right on the inside before you try to throw a big front and exterior to the public, otherwise they will surely see through the paint.

It is an old saying that "If you expect your children to display good table manners when they go away, you must begin at home." So there is the key—begin at home, right in your own organization. After you have selected the proper type of employees, you must educate them. Let them know that you have their interests at heart—that they are not mere cogs in a wheel of a machine, but are human beings, that they are a part of the company, and its success is largely dependent upon their industry, and its good name upon their conduct. Teach them to always be courteous in their attitude toward each other and to exercise the Golden Rule in their dealings. Speak to them as gentlemen—treat them as gentlemen, and after a while they will find out they are gentlemen and will leave a gentlemanly impression upon the minds of the public.

If you are situated so that you can do so, inaugurate a Welfare Department for employees—a room or two equipped as a library and rest room. This gives the employees a chance to meet and talk things over—a kind of daily get-together meeting of the employees themselves. This will be a means to holding your organization together. Have a talk given them by the general manager on general company policy, and by heads of various departments relative to the various phases of the work. It will inspire them to learn more and be better employees.

If a central station is large enough to support such things, a school for the education of employees is a fine investment and will earn large returns. If you cannot conduct a regular school, occasional lectures will do much to stimulate interest. A yearly dinner, or an annual picnic, will do much to keep your organization with you. The Public Policy Committee of the National Electric Light Association has made many suggestions for carrying out welfare work, such as sick benefits, service annuities, profit sharing, etc. Every central station should put such welfare work into effect just as soon as their financial condition will permit. Once these schemes are firmly established, the employee will take more interest in his work, and be a better servant.

A standing prize offer for suggestions by employees in the improvement of the company's service is a valuable asset with the employee and with the company. The money can be awarded according to the value of the suggestion, this question to be decided by a committee of heads of departments. In addition, a separate prize for specific results is a good thing. I know of one particular case where a prize of $5 was offered for the employee outside the new business department turning in leads developing the most new business, and 100 new customers resulted. These things get the spirit of organization rather than the letter, and that's what we want, school and college spirit.

Let it be firmly impressed on your mind that your organization is everything. You may have beautiful theories of the proper treatment of the public, but you actually come in contact with but few customers. The customer may know nothing of your beautiful theories, but a lot about the insolent attitude of some collector or "trouble shooter." If you find that in spite of proper treatment, some members of your organization will not fall into line, will not adopt modern ideas of commercialism, are not actuated by a desire to please the customer, there is but one thing to do—get them out of the way and get someone in who will go about their work with the proper spirit.

You should not allow an employee who is out of sympathy with your ideas to stay in your organization any longer than the bees allow a drone to stay in the hive. Have good live wires with modern ideas or none at all. Every wideawake employee who does his work well will leave that impression on the mind of customers, and elevate every employee of the company, as well as himself, in the eyes of the public.

Courtesy and prompt attention to the public by every employee is the key note and first essential requirement for maintaining proper relations with the public. In how many central-station offices are customers kept waiting to pay their bills, while some clerk finishes footing up a column of figures? How often is the cashier instructed to consider it his most important duty to see that customers are promptly attended to, and that each customer is cheerfully greeted, and a polite "thank you" given with each receipt. A small matter you may think, and something that the manager, who is too often absorbed in some engineering problem, has no time to think about. But it is little things like these that make or mar our relations with the consumers.

What about you telephone operator? Is she prompt, pleasant, and accommodating? The question of answering the telephone may again seem like a very small matter to an engineer, but please remember that an impatient, ill-tempered telephone operator will do much to create a feeling of discontent with your service and your treatment of the public. When you receive a complaint that your customer's lights are out, is it attended to promptly and cheerfully, or does the customer have to call up two or three times before someone goes down and replaces a fuse? And next day, do you have the telephone operator call up all customers who complained the previous day, and in this way find out if their complaint was satisfactorily taken care of? This does not take much time, or cost anything to speak of, but it gives the customer the impression of true "Readiness-to-serve." Yet how many central stations take this much trouble to create this impression?

What about your whole system of following complaints? Is every complaint followed in a systematic manner with a written record of every step, and with someone whose business it is to watch and see that it is finally and properly disposed of? If it is not followed up in this way in your city, you can be sure you have found one of the causes for discontent. If you receive a complaint of poor voltage, do you at once install a curve-tracing voltmeter, and submit such records to the customer to prove to him that his service is first class? If you receive a complaint on a high bill, do you install a curve-tracing ammeter, and show the customer just how much current he was using during each hour of the twenty-four, and how the record so obtained checks up with the reading on his wattmeter?

Too many central stations do not take the trouble to try to satisfy their customers in these matters, but merely consider all complaints as kicks of some crank, and yet they wonder why they have trouble with the public. Please remember that the great mass of people are honest and are trying to do what is right. You will seldom receive a complaint unless the customer truly thinks he has good grounds for complaining, and it is certainly up to you to investigate and settle every complaint received.

When the Customer Complains.

Every fall, as the nights lengthen, the lighting companies are compelled to go through the same processes of explanation for those customers who fail to discern any reason for an increase in their bills for current.

And every fall the same stale arguments are offered. True, the arguments are valid; that the current consumption should increase is almost axiomatic.

You'd have to bypass the meter to prevent it.

But validity alone is not sufficient. The strongest and most lasting impressions are made by suggestions that leave something to the intelligence or the imagination.

This fall, tackle your "Bill-raiser" problem from another angle and attach to your September bills a neatly printed slip, containing the following fable.

A FABLE.

Once upon a Time there was a Town, in which the Supply of Electricity was Limited.

There was enough for the Summer Months, when the Sun rose Early and set Late, and the People sat on the Porch at Night.

But in Winter, when the Nights were Longer, with Everybody at Home, Dark Mornings, Later Bedtime and More Entertaining, the Supply ran Short.

So the People of that Town, as if with One Voice, Clamored for a Larger Supply of Electricity, which was Finally Obtained.

The more abundant Supply of Electricity brought More Cheer, More Comfort, Better Health and More Happiness into the Homes of that Town, and then the People of that Town Complained, because their Bills were Higher in Winter than in Summer.

Weren't they Unreasonable People?

C. Ridderhof.

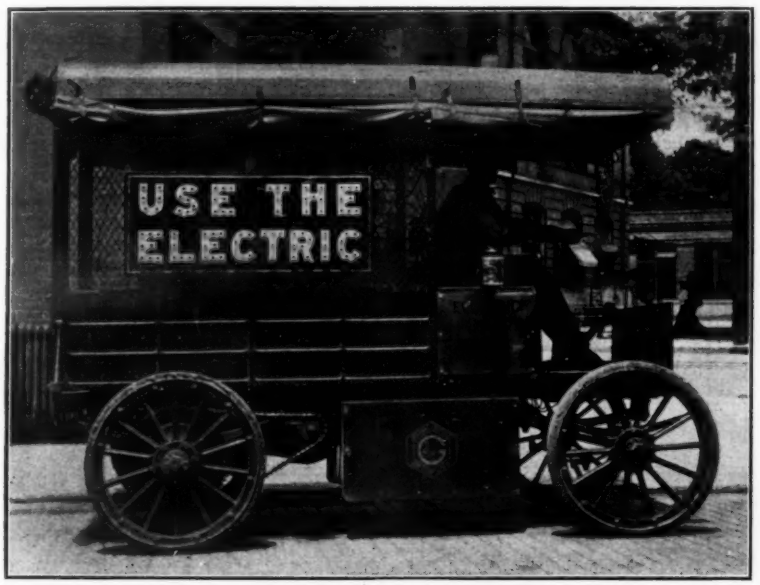
Co-operative Advertising of Electric Signs and Vehicles by the Central Station.

Another use has been discovered for the electric sign. The Meridian (Miss.) Light & Railway Company recently placed in service some General Vehicle trucks for its construction and maintenance work, and an idea was originated by C. A. Knight of that company to place on each side of one of these trucks a small electric sign to be operated from the truck battery to advertise incidentally the electrical vehicle business and, at the same time, the use of electric signs.

These signs were made in small panels four feet long and twenty inches wide, reading in six-inch raised electric letters "Use the Electric" in two lines. These letters were fitted with candelabra receptacles and small Mazda lamps and connected to the vehicle battery in such a way as to be controlled by the driver of the car. These signs were installed on a 1,000-pound truck and the idea has provoked considerable discussion, which, of course, was favorable to the central station in Meridian.

Mr. Knight writes that the next signs of this character that he installs will be designed with fewer lamps if possible, as the only drawback to the scheme is that it is similar to the Mississippi river steamboat with the big whistle. When the boat runs, they can't blow the whistle, and when they blow the whistle, they can't run the boat. This difficulty has been overcome, however, by lighting the signs whenever the truck comes to a standstill and turning them off when starting. The signs are also lighted and used when coasting, of course, only after dark.

The signs were furnished by the Greenwood Advertising Company of Knoxville, Tenn., and finish of same matched the maroon body, coach finish, used on the truck.



Greenwood Electric Sign on Electric Vehicle.

Improvements in Baltimore.

Extensions and improvements costing $500,000 to the big power plant of the Consolidated Gas, Electric Light and Power Company at Westport, Baltimore, Md., were started on September 5, when the company placed a contract for a turbogenerator of 20,000 horsepower with the General Electric Company, to be completed by June 1, 1914.

The improvements will consist of the building of a new boiler house, with complete equipment for coal-hauling apparatus, stokers, pumps and heaters. The stacks will be 20 feet inside diameter and 250 feet high. This will exceed the height of any building in Baltimore. The first installation will consist of six 1,000-horsepower boilers equipped with automatic stokers.

The Westport power house is situated on a tract of 23 acres in Baltimore County, and has a water frontage of 1,100 feet and railroad facilities of two trunk lines. Its present equipment consists of six 13,000-volt generators, aggregating 27,300 horsepower. Eighteen boilers supply steam to the generating equipment.

Bicycles for Central-Station Employees.

The bicycle squad of the Louisville Gas & Electric Company, Louisville, Ky., has grown to large proportions, about 20 men on wheels being employed, in addition to the several who use motorcycles. Donald McDonald, vice-president and general manager of the company, said that the use of bicycles was reserved for any kind of work "that can be done by a man with a pair of pliers." That is to say, where tools of any elaborate nature are required, either the motorcycle squad or a regular service wagon is rushed to the spot. The force of meter-readers of the company are also equipped with bicycles, enabling them to traverse their territory more rapidly, although in certain sections, of course, a bicycle is of little use, as meters must be read in practically every house.

New Franchise for Lexington Company.

Prospects now favor definite action on the franchise ordinance which is being considered by the board of commissioners of Lexington, Ky. The franchise is desired by the Lexington Utilities Company. A privilege created some time ago was rendered invalid by a referendum vote on the proposition. A franchise ordinance proposed by Mayor Cassidy provides a maximum charge for current for lighting of 12 cents per kilowatt-hour, as compared with 15 cents, the maximum fixed in the ordinance which was defeated. The utilities company is now operating under an ordinance which has some time to run, but is anxious to get action on the new proposition in order to be able to proceed with financing important improvements.

Electrical Construction

A HIGH-CLASS CONDUIT JOB IN A CARPET STORE.

By H. G. Wilson.

A popular way of displaying carpets and large rugs in stores where these are kept for sale is to hang them in vertical planes from sets of radical-arm supports hinged to a large central vertical post. This results in both sides of the entire carpet or rug being easily visible, since the hinged arms can be turned from one position to another without difficulty. Carpets thus hung are kept in about the same position with reference to one another as are the leaves in a book standing on end while partially open.

The proper lighting of carpets and rugs thus arranged is a matter which the merchant can afford to give the closest attention; he is sure to lose money by failing to do so. Numerous schemes have been used, but in quite a number of cases the wiring to the lamps has been done in a very unsatisfactory way. In a place of this sort it is particularly important that the electrical work be entirely of a neat and substantial design. An installation in which these requirements are fulfilled in an unusually large measure is described here.

The accompanying figure indicates the general layout of the large room in which the carpets and rugs are kept on display.

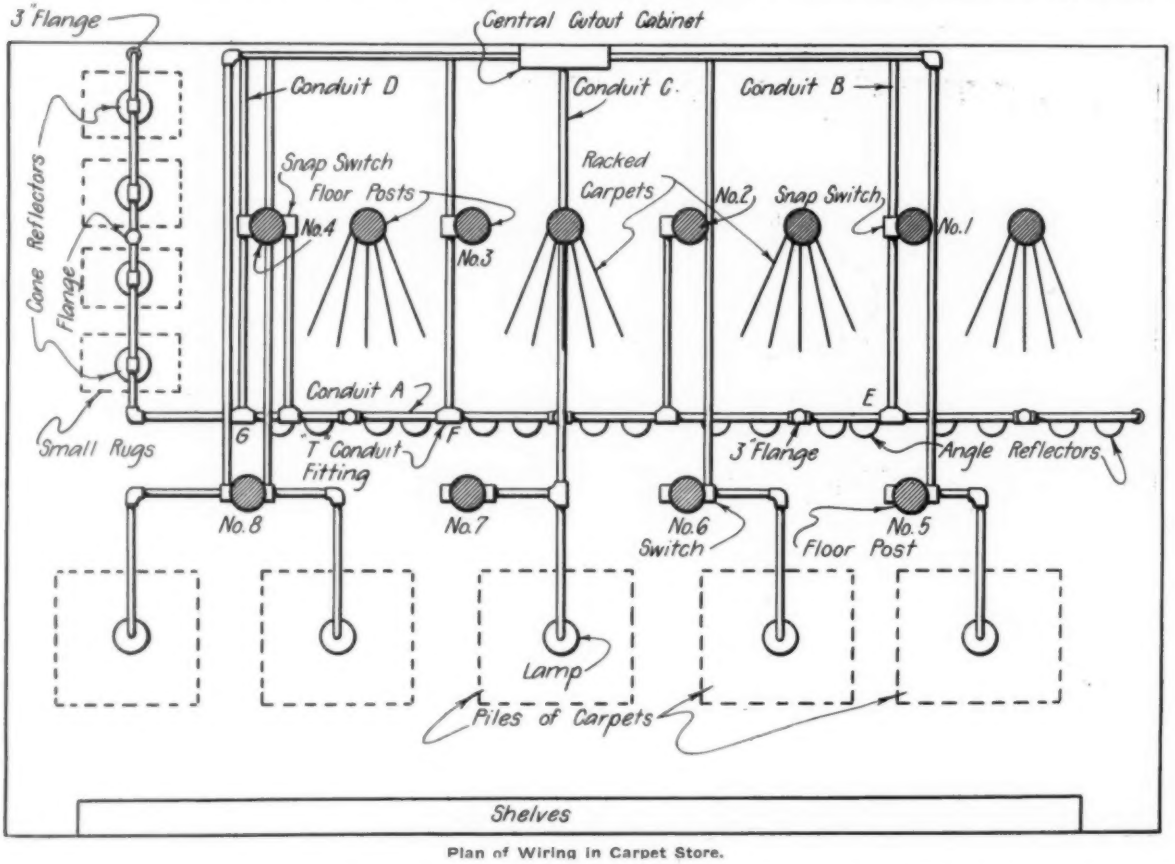
The electric service comes into the room at the point where the central cutout cabinet is shown in the figure, this being the main distribution center of the floor. The wiring is all in exposed conduits.

For lighting the carpet racks incandescent lamps dropped down from the line of conduit *A* are employed, each lamp being provided with a standard angle reflector. This run of conduit is connected with the cutout cabinet by means of conduits like *B*, *D*, which run across the ceiling and drop down at the points *E*, *F* and *G*.

At post No. 1, a switch leg is dropped down for the control of the lamps to the right of the post, and on posts Nos. 2, 3 and 4 there are likewise snap switches for controlling the lamps illuminating the carpet racks situated near these points.

The run of conduit *A* is supported partly by the conduits which come to it from the ceiling and partly by pipe braces extending to the ceiling from the points where the three-inch flanges are installed.

For lighting the five piles of carpets shown near the shelves single-lamp fixtures installed one directly over each pile are employed. A circuit is run from the central cutout cabinet to each one of these lamps, the switch leg for the control of the lamp being dropped down on posts Nos. 5, 3, 7 and 8.



Plan of Wiring in Carpet Store.

CO-OPERATION OF THE ALLIED ELECTRICAL INDUSTRIES FROM THE STANDPOINT OF THE ELECTRICAL CONTRACTORS.[1]

By John A. Gilliland.

From the contractor's point of view, the subject under consideration naturally presents itself under two headings, namely: co-operation between the manufacturer, the jobber and the contractor, and co-operation between the central station and the contractor.

There has always been a feeling of distrust between the manufacturer, jobber and contractor. There are few industries in which there is such a tendency by the jobber to retail to the consumer at wholesale prices, as there is in the electrical business. The contractor or dealer is ignored. On the other hand, the large contractor does not depend on the jobber for many of his supplies, but buys direct from the manufacturer. Therefore, the jobber does not feel under obligation to protect the contractor. Some advocate the elimination of the jobber in general, contending that the present high cost of living is caused, in a large part, by the present system of passing commodities through several hands from the manufacturer to the consumer. But in the electrical industry the jobber is clearly a necessity. The contractor requires such an enormous variety of materials with which to carry on his business, that it would not be practicable for him to buy a comparatively small quantity of each from a large number of manufacturers, particularly the small contractor, who is by far in the majority.

If the manufacturer and jobber would get together on a mutual basis, the jobber selling only to electrical contractors, large industrial plants and railroads which would not solicit the services of the contractor in any case, the present feeling of distrust would in a large measure be replaced by confidence, and a co-operation would be established that would be of benefit to all.

Our principal interest in these notes will be the subject of co-operation between the central station and the contractor, however.

Let us consider first the illegitimate contractor, who is largely responsible for the existing feeling of suspicion of the central station and the public against the contractor. He is a man without responsibility or honor, his work is defective from either ignorance or dishonesty. The ease with which such a man can get into the contracting business is surprising. A fair knowledge of wiring and an elastic conscience are the main requirements. You will usually find "Electrical Engineer" on his business card.

This type of contractor cannot be too severely condemned; he should be eliminated from the game. A license law, which has proved effective in some localities, should be made universal—a law that would require the contractor desiring to secure a license, to prove that he has the ability to conduct such a business. If it is found that the licensed contractor is deliberately doing dishonest work, contrary to the National Electrical Code, his license should be revoked. The lack of rigid inspection, or the lack of any inspection at all in many localities, gives this contractor an opportunity to do dishonest work which he is only too ready to take advantage of.

Many central stations will connect with anything, regardless of the character of the work. Their only interest, apparently, being to see that a meter is installed and working properly. For example, a house was recently wired with bell wire, with wood-base switches to control the lights, and was connected without question by the electric lighting company. This, of course, is an extreme case, but it is not at all uncommon to find finished-house wiring fished in without flexible conduit, or any protection other than the rubber cover and braid on the wire; it is not always rubber covered wire, in fact. In communities where there is inspection, short pieces of flexible conduit are sometimes fastened at the outlet, the rest of the wire being unprotected, and the "bluff" passes. Many wiremen are instructed to do this kind of work by their employers. Some do it on their own initiative, and are very much surprised, when employed by a legitimate contractor, to find that the practice is not universal. It is certainly marvelous to what extremes an unscrupulous contractor can go.

The average property owner has no idea of the risk that he is taking by having his work done by an incompetent or dishonest contractor. There is not only the danger of fire from defective wiring, but the chance of vitiating his insurance when he has had a fire from any cause and the insurance adjusters find that the wiring does not comply with the National Code. Again, if by any chance, an insurance inspector should discover the defective wiring, the property owner would get no redress from the dishonest contractor. The central station can do much to rectify this condition; in fact, it has the whip hand and can refuse to connect until the work is done in accordance with the Code.

Then we have the misguided but honest electrician, who, because he is a good electrician, thinks that he would make a good contractor, forgetting the fact that the one is a trade and the other a business. He should have our sympathy. His name is legion. After one, or perhaps two years of heartbreaking struggle with the problem, he is back in the ranks and another is ready to take his place, eager to learn by experience what he should learn by observation.

The up-to-date and progressive central station has a commercial department which has become a valuable and important part of its organization. The commercial manager is of necessity a man of education and ability. He recognizes the importance of co-operation in present-day business, and it behooves the contractor to work in harmony with him to the advantage of both. If the contractor is alive to his opportunities, he will see to it that he cultivates the goodwill of the commercial manager, and will find that this individual is usually ready to meet him more than halfway.

There has been a large diversity of opinion among central station managers as to whether or not the central station should do wiring. During the early days of the electrical industry, the central station was the leading, and often the only wiring contractor in the community. Some of them operated at a profit, others made the installations at cost, and, in many cases, without charge, in order to create a demand for current. It is no longer necessary that the central station should feel obliged to engage in a business for which it is not equipped and which is foreign to the business for which it was organized, namely, that of the manufacture and sale of current. There are competent and reliable contractors everywhere who are ready to give their best services at a very reasonable profit. Competition is so keen that the customer need have no fear of being charged an exorbitant price, provided that he does his business with the legitimate contractor.

Bitter charges of price cutting and unfair sales practices have been made by the contractors against the central stations. In one state the contractors went so far as to carry the matter to the courts, and, of course, lost their case. The central station has a perfect right to do contracting and to sell commodities at any price that it pleases. It is up to the contractor and the dealer to prove that it is for the best interests of all concerned to let the contractor do the wiring, which is his specialty, and to co-operate in the sale of commodities. It has been argued by the central station that co-operation did not come from the contractor; that retail stores were not operated; that the contractor was not aggressive in securing new business. While this may have been correct at one time, it is hardly true today. The contractor is waking up to the fact that, if he would be in the swim, he must conduct a retail store, and get in close touch with the buying public.

[1] A paper read at the fifth annual convention of the New England Section of the National Electric Light Association.

The same lack of co-operation and indifference may be said to have been true of the central station. When the industry was young, the growth was rapid. There then appeared to be a period of apathy, almost antagonism in many cases, which seemed to say, "If you want service, you have got to come to us." The business was, and still is, monopolistic, and competitive only with other methods of furnishing service for light, heat and power. But there has been a revolution in the policy and attitude of the central station toward the public during the past few years. Note the contrast in the present-day central station, whose motto is "Readiness to Serve."

But a few years ago the contractor did not have a line of goods to sell that was particularly attractive to the public. The sale of fixtures, electric fans in their season, and commodities regularly used by the trade were all that he had to offer. The advent of the pocket flash lamp brought increased patronage. It is surprising the number of people that this little article brought into contact with the contractor through his retail store. Today the large variety of heating and other current-consuming devices, which is rapidly increasing, gives the contractor a greater opportunity and incentive to establish a retail trade. The central station should be convinced that it is for its best interests to co-operate, rather than attempt to control or monopolize the sale of appliances by selling at cost or less. These will be better and more thoroughly advertised and a larger amount sold, if the sales are pushed by several stores than if sold only by the central station, even at cost prices.

The great obstacle at present, more particularly in the East, to the introduction of heating appliances is, not the price of the article, but the excessive cost of operating. One of the first questions asked by the customer is, "How much will it cost to operate?" It is impossible to talk economy of operation of the electric range with a power rate of eight cents, and of the electric flat iron with a lighting rate of eleven cents. We will hope that the time may come soon when the rapidly increasing volume of business will warrant the reduction of rates to a point where the average householder can afford to use electricity for cooking, heating, ventilation and refrigeration, as well as for lighting, and the slogan "Electricity for Everything" may become a fact instead of a theory.

What an enormous field is before us! But it can be developed only when rates are established which can compete successfully with gas and other means of cooking and heating. Note the difference in the West, where it is not uncommon to find cooking rates of two and one-half and three cents. The day is close at hand when a simple and moderate priced automatic refrigerating plant, designed to be used in the average home, will be placed on the market. The high prices asked for ice during the past season will be an added incentive for the production of such a machine.

Another matter that should be a source of benefit and profit to the central station and the contractor is the co-operation of both with the architect and the prospective builder. The average architect is far behind the times as regards electric wiring. He does not give the wiring problem the attention that it deserves. Usually the light outlets and a few switches are marked on the plans and the specification is a brief instruction to wire to the lights and switches as shown on the plans. The layout is along the lines that would represent conditions five or ten years in the past. The average contractor is ready and willing to lay out any wiring system, draw plans and write specifications. If the architect or owner felt that, by allowing the contractor to do this work, he would be under obligation to give him the work, or that the contractor was "doctoring" the specification so that he would get it anyway, the soliciting would better be done by the commercial department of the central station, which would co-operate with the contractor in laying out the work in a manner consistent with present and future requirements.

Following is the copy of a specification intended to cover the electric light wiring of a better than ordinary dwelling house that was built about two years ago:

"The building shall be thoroughly equipped from the source of supply to each outlet, as marked on the plan, and the wires so well protected as to exclude water and gas.

"To be knob-and-tube system.

"To the end of each wire must be at all times accessible for inspection and repairs; the location of junctions, elbows, the position of switches, etc., must be in accordance with the rules herein set forth, and the manner indicated on the drawings.

"The size of the wires shall be determined on the basis of each lamp.

"All tubes shall be of sufficient size to allow the wires to be readily drawn in or replaced at will; no tubes less than one-half inch inside diameter shall be used.

"No staples allowed unless absolutely necessary."

The architect apparently tried to spread himself, but didn't know how. Here is another specification, a marvel of brevity, that has been used by an architect for years, to cover the light wiring in any kind of a building:

"Wire the building to outlets as marked on the plans or as required by the owner."

When asked by the contractor to be more specific, he stated that he could not afford the time to go into details. Yet this architect is doing a good business and has designed many fine buildings.

The theory of co-operation is a beautiful thing. We find it exemplied in all of the trade journals, and so often is it repeated and preached that co-operation bids fair to become the most overworked word in the English language.

But is not the theory already being applied to practice, and in a practical manner? The Society for Electrical Development was organized for this purpose, and has made wonderful progress during the short time that it has been in existence. The Jovian Order is assuming large proportions, and is doing much to promote a better feeling of friendship and goodwill between the manufacturer, jobber, central station and contractor.

Most people are familiar with the principles and policies of the Electric Development Association. The Association is organized for the purpose of insuring active and consistent co-operation among all the business men associated with the electrical industry in New England. It states that the electrical industry divides itself into two branches; first—"the manufacture, sale and erection of current-consuming devices," which branch is covered, of course, by the manufacturer, jobber, and contractor; second—"the manufacture, distribution and sale of current," which is the business for which the central station was organized.

We should always have in mind the fact that co-operation cannot exist unless all concerned are convinced that they will receive direct benefit and profit; that the fundamental basis and the final object of co-operation in business is profit.

Convenient Way to Remember Ohm's Law.

Ohm's Law is the basis of solution of perhaps a majority of electrical problems. Before he can be trusted with electrical apparatus, the electrician must know the relations expressed in this law in a general way, at least, whether he knows them as Ohm's Law or not. To make sure that I will always remember this law when I need to use it, I have worked out the plan described below.

Let E=volts, R=resistance, A=amperes, and W=watts. Then memorize three words: *ERA*, *EAR*, and *RAE*. Then it is no trouble to remember that E divided by R equals A, that E divided by A is the resistance R, and that the product of R and A is E. Finally, it is convenient to carry the group of letters *EAW* in mind and to remember that the E times A is the wattage W of the circuit.

William E. Rhodes.

A Convenient Device for Testing Armatures.

The apparatus illustrated in the accompanying figure is something that I have found exceedingly convenient and satisfactory in making tests for faults in the armatures of direct-current motors and generators. The testing apparatus consists of an attachment plug, an incandescent lamp, a buzzer and a standard type of head-gear telephone receiver. The lamp and buzzer are connected in series and one set of the four terminals of this circuit is connected to a standard attachment plug, which can be employed to make connection with any convenient lighting circuit, the other two terminals being equipped with any convenient sort of test points. Test points are also supplied on the leads of the telephone receiver.

The figure makes the manner of using the test apparatus clear enough. The attachment plug having been connected in circuit, the test points on these

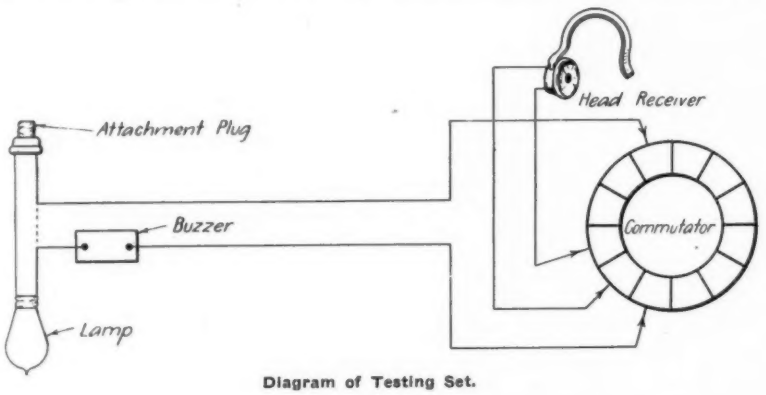


Diagram of Testing Set.

two leads are applied to segments of the commutator under test in the manner indicated. The electrician then places the telephone receiver to his ear and applies the other two test points to adjacent commutator segments. If there is a short-circuited coil between two segments practically no noise will be heard in the receiver, while an open coil will result in a very loud sound. If the armature is in good condition the receiver will sound the same whatever segments are touched.

I have sometimes found it best to use two lamps in the test circuit instead of the one lamp shown in the figure. Where there was no circuit which could be conveniently drawn on for the test current, I have sometimes used a few dry cells, connecting them in just beyond the buzzer.

By moving the test points closer together or farther apart the right position for making the tests can always be found. This shifting of the points is necessary because of differences in the type winding. L. L. Long.

Municipal Electrical Inspection.

In order to compare the practices of different cities in the United States in regard to municipal inspection, statistics from the annual reports of a number of them have been collected below. Probably a majority of the cities of the country now undertake electrical inspection, but the practice is by no means general, even among the larger cities. Philadelphia, St. Louis, Buffalo, Milwaukee and Cincinnati are among those having no inspection departments, this work being left to the fire-insurance organizations in their respective territories. In New Orleans the initial inspection is made by the Louisiana Fire Prevention Bureau; if defective wiring is reported, the municipal inspector then makes an inspection, but otherwise not; no fee is required for the municipal inspection and naturally the expenses are kept low.

No attempt has been made to secure complete reports from all cities in the country. The cases selected for inquiry were, however, so chosen as to cover a large range in both size and geographical distribution, reports were not forthcoming from a large number of cities where inquiries were made. The figures given apply in most cases to the calendar year 1912, but in some cases to 1911, while in others the fiscal year ends in June or some other month than December. All may be taken, however, to represent present conditions.

It will be noted that there is a great divergence of practice in regard to the collection of fees, and their relation to the expenses of the inspection department. Fees for permits are usually a small sum, ranging from 25 cents to one dollar; but fees for inspection are more variable, being usually determined by a schedule which takes into account the number of outlets for incandescent lamps, the capacity of motors as well as their number, etc. The details of these various schedules cannot all be given here, but two typical ones are included for illustration.

The figures given for expenses in the cases below are not always accurate, since electrical inspection is not always carried on by a distinct department and the expenses cannot always be segregated. Sometimes city officials and employees devote only a part of their time to this work. In all cases salaries are included, as well as such office expenses as are separately accounted for. In no case, probably, is such a thing as office rent, lighting or heating included, but only such items of expense as are covered by a distinct appropriation for the department. The population of each city, according to the census of 1910, is given in parentheses after the name.

It will be noted that in Chicago and Los Angeles the receipts are greatly in excess of the expenditures. In all of the other cities listed, the balance is either small or upon the other side of the account. In Minneapolis there are no fees for either inspections or permits.

New York, N. Y. (4,766,883): No fees for inspection. Expenses, $125,000.

Chicago, Ill. (2,185,283): Receipts, $163,341. Expenses, $74,812. Number of inspections, 98,414.

Boston, Mass. (670,585): No fees for inspection; fees for permits, $4,276. Expenses, $61,747. Number of inspections, 32,480.

Baltimore Md. (558,485): No fees. Expenses, $4,480.

Detroit, Mich. (465,766): Receipts, $5,725. Expenses, $13,134. Number of inspections, 16,338.

San Francisco, Cal. (416,912): Receipts, $13,222. Expenses (salaries only), $12,495. Number of inspections, 13,889.

Newark, N. J. (347,469): No fees. Expenses, $5,000. Number of inspections, 6,175.

Washington, D. C. (331,069): Receipts, $5,536. Expenses (estimated), $7,000. Number of inspections, 15,880.

Los Angeles, Cal. (319,198): Receipts, $41,422. Expenses, $25,804.

Minneapolis, Minn. (301,408): No fees. Expenses, $6,150. Number of inspections, 14,756.

Louisville, Ky. (223,928): No fees.

Toledo, O. (168,497): Receipts, $2,942. Expenses, $4,166.

Worcester, Mass. (145,986): No fees. Expenses, $2,186.

Grand Rapids, Mich. (112,571): Receipts, $2,650. Expenses, $1,970. Number of inspections, 7,222.

Nashville, Tenn. (110,364): Fees, $1,522. Number of inspections, 2,929.

Lowell, Mass. (106,294): No charge for interior inspections. Expenses, $2,526.

Spokane, Wash. (104,402): Receipts, $6,202. Expenses, $6,660. Number of inspections, 11,451.

Peoria, Ill. (66,950): Receipts, $2,152. Expenses (salaries), $1,320. Number of inspections, 1,473.

Portland, Me. (58,571): No fees. Ex-

penses, $1,055. Number of inspections, 1,159.

Pasadena, Cal. (30,291): Receipts, $4,504. Expenses, $4,261.

TABLE I.—INSPECTION FEES.

Incandescent Lamps. (50 Watts.)

Incs.	Fees	Incs.	Fees	Incs.	Fees
1	$ 1.00	50	$ 4.75	99	$ 8.43
2	1.00	51	4.83	100	8.50
3	1.00	52	4.91	101	8.56
4	1.00	53	4.99	102	8.62
5	1.00	54	5.07	103	8.68
6	1.00	55	5.15	104	8.74
7	1.00	56	5.23	105	8.80
8	1.00	57	5.31	106	8.86
9	1.00	58	5.39	107	8.92
10	1.00	59	5.47	108	8.98
11	1.10	60	5.55	109	9.04
12	1.20	61	5.63	110	9.10
13	1.30	62	5.71	111	9.16
14	1.40	63	5.79	112	9.22
15	1.50	64	5.87	113	9.28
16	1.60	65	5.95	114	9.34
17	1.70	66	6.03	115	9.40
18	1.80	67	6.11	116	9.46
19	1.90	68	6.19	117	9.52
20	2.00	69	6.27	118	9.58
21	2.10	70	6.35	119	9.64
22	2.20	71	6.43	120	9.70
23	2.30	72	6.51	121	9.76
24	2.40	73	6.59	122	9.82
25	2.50	74	6.67	123	9.88
26	2.59	75	6.75	124	9.94
27	2.68	76	6.82	125	10.00
28	2.77	77	6.89	126	10.06
29	2.86	78	6.96	127	10.12
30	2.95	79	7.03	128	10.18
31	3.04	80	7.10	129	10.24
32	3.13	81	7.17	130	10.30
33	3.22	82	7.24	131	10.36
34	3.31	83	7.31	132	10.42
35	3.40	84	7.38	133	10.48
36	3.49	85	7.45	134	10.54
37	3.58	86	7.52	135	10.60
38	3.67	87	7.59	136	10.66
39	3.76	88	7.66	137	10.72
40	3.85	89	7.73	138	10.78
41	3.94	90	7.80	139	10.84
42	4.03	91	7.87	140	10.90
43	4.12	92	7.94	141	10.96
44	4.21	93	8.01	142	11.02
45	4.30	94	8.08	143	11.08
46	4.39	95	8.15	144	11.14
47	4.48	96	8.22	145	11.20
48	4.57	97	8.29	146	11.26
49	4.66	98	8.36	147	11.32

(Thus up to 300 lamps.)

To obtain fee for over 300 incandescent lamps, add 4 cents per lamp for all over 300.

Power.

Horse-power	Fee	Horse-power	Fee	Horse-power	Fee
1	$ 1.00	34	$22.00	68	$34.50
2	2.00	35	22.50	69	34.75
3	3.00	36	23.00	70	35.00
4	4.00	37	23.50	71	35.25
5	5.00	38	24.00	72	35.50
6	5.75	39	24.50	73	35.75
7	6.50	40	25.00	74	36.00
8	7.25	41	25.50	75	36.25
9	8.00	42	26.00	76	36.50
10	8.75	43	26.50	77	36.75
11	9.40	44	27.00	78	37.00
12	10.05	45	27.50	79	37.25
13	10.70	46	28.00	80	37.50
14	11.35	47	28.50	81	37.75
15	12.00	48	29.00	82	38.00
16	12.55	49	29.50	83	38.25
17	13.10	50	30.00	84	38.50
18	13.65	51	30.25	85	38.75
19	14.20	52	30.50	86	39.00
20	14.75	53	30.75	87	39.25
21	15.30	54	31.00	88	39.50
22	15.85	55	31.25	89	39.75
23	16.40	56	31.50	90	40.00
24	16.95	57	31.75	91	40.25
25	17.50	58	32.00	92	40.50
26	18.00	59	32.25	93	40.75
27	18.50	60	32.50	94	41.00
28	19.00	61	32.75	95	41.25
29	19.50	62	33.00	96	41.50
30	20.00	63	33.25	97	41.75
31	20.50	64	33.50	98	42.00
32	21.00	65	33.75	99	42.25
33	21.50	66	34.00	100	42.50
		67	34.25		

To obtain fee for over 100 horsepower, add 25 cents per horsepower up to and including 250 horsepower.

100 horsepower, $42.50; above 100 horsepower to 250 horsepower, 25 cents per horsepower.

250 horsepower, $80.00; above 250 horsepower to 500 horsepower, 10 cents per horsepower.

500 horsepower, $105.00; above 500 horsepower, 5 cents per horsepower.

Arc Lamps and Incandescent Lamps of Over 500 Watts.

Arcs	Fees	Arcs	Fees	Arcs	Fees
1	$ 1.00	34	$19.90	68	$28.46
2	2.00	35	20.15	69	28.65
3	2.80	36	20.40	70	28.90
4	3.60	37	20.65	71	29.15
5	4.40	38	20.90	72	29.40
6	5.10	39	21.15	73	29.65
7	5.80	40	21.40	74	29.90
8	6.50	41	21.65	75	30.15
9	7.20	42	21.90	76	30.40
10	7.90	43	22.15	77	30.65
11	8.50	44	22.40	78	30.90
12	9.10	45	22.65	79	31.15
13	9.70	46	22.90	80	31.40
14	10.30	47	23.15	81	31.65
15	10.90	48	23.40	82	31.90
16	11.50	49	23.65	83	32.15
17	12.10	50	23.90	84	32.40
18	12.70	51	24.15	85	32.65
19	13.30	52	24.40	86	32.90
20	13.90	53	24.65	87	33.15
21	14.40	54	24.90	88	33.40
22	14.90	55	25.15	89	33.65
23	15.40	56	25.40	90	33.90
24	15.90	57	25.65	91	34.15
25	16.40	58	25.90	92	34.40
26	16.90	59	26.15	93	34.65
27	17.40	60	26.40	94	34.90
28	17.90	61	26.65	95	35.15
29	18.40	62	26.90	96	35.40
30	18.90	63	27.15	97	35.65
31	19.15	64	27.40	98	35.90
32	19.40	65	27.65	99	36.15
33	19.65	66	27.90	100	36.40
		67	28.15		

To obtain fee for over 100 arc lamps add 25 cents per lamp for all over 100.

TABLE II.

Fees for Dynamo Installations.

	Per Kilowatt
For the first 5 kilowatts	$1.00
For the next 45 kilowatts	.50
For the next 50 kilowatts	.25
For the next 100 kilowatts	.15
For all over 200 kilowatts	.10

The minimum charge for each dynamo installation shall be $5.00.

Fees for Motor Installations.

	Per Horsepower
For the first 5 horsepower	$ .50
For the next 5 horsepower	.40
For the next 10 horsepower	.30
For the next 30 horsepower	.15
For the next 50 horsepower	.075
For all over 100 horsepower	.05

Wiring for Motors.

	Per Horsepower
For the first 5 horsepower	$0.30
For the next 20 horsepower	.20
For the next 25 horsepower	.15
For all over 50 horsepower	.10

The fee for motor-generator wiring shall be 50 per cent more than the motor wiring fees, as herein provided.

Where motors and wiring for same are installed by one contractor, under one permit covering both, the fee shall be at the rate of seventy (70) per cent of the aggregate of the separate items.

Fee for Incandescent Lamps.

	Per Lamp
For the first 10 circuits	$0.05
For the next 40 circuits	.04
For all over 50 circuits	.03

Each branch circuit is considered as not wired for fewer than 10 lamps, and is charged for accordingly.

Arc Lamps.

For the first 2 lights, each	$0.50
For the next 2 lights, each	.30
For all over 4 lights, each	.20

Wiring for Arc Lamps.

For the first 2, each	$0.50
For the next 2, each	.30
For all over 4, each	.20

Where arc lamps and wiring for same are installed by one contractor, under one permit covering both, the fee shall be at the rate of 70 per cent of the aggregate of the separate items.

The State of Washington now stands first in the lumber production, with Louisiana second in the production of that commodity.

LETTER TO THE EDITOR.

The Small Dealer's Cost System.

To the Editor:

Being a small contractor, I was much interested in R. E. Smith's series of articles which appeared in your issues of August 9, 17, 23 and 30, and I gleaned some ideas from them which I hope to turn to profit.

I have used the cost system he describes for the past five years with satisfaction. However, I combine petty-cash and time slips by requiring every workman's expense to be entered by him on the time slip. Any money previously advanced him is entered on a cheap loan book which is accounted for as cash in drawer until canceled off by reimbursement from pay roll. All material slips are numbered and numbers posted to outside of envelope, thus guaranteeing that no job is billed before all slips are in. Time is also posted on the outside of the envelope which thus gives a record of the job to date and finally shows cost and billing price.

A. E. Truesdell.

Pittsfield, Mass., September 16, 1913.

Among the Contractors.

Allen E. Falconer, who recently established an electrical contracting business at 6 East Erie Street, Lorain, O., has just completed the installation of wiring and fixtures in the new Franklin Apartments building in Lorain.

The Perry Electric Company, of which Charles M. Peterson is manager, has recently established an electrical shop at 933 East Sixth Street, Erie, Pa. The company specializes in motor repairs of all kinds, in which class of work Mr. Peterson has had 22 years of practical experience.

The Fowler Electrical Company, of Toledo, O., will install the electric wiring in the buildings of the county infirmary and tuberculosis hospital of Lucas County. The job will total $1,000, approximately.

The Star Electrical Company, of Erie, Pa., is doing the wiring in the new building of the Bell Telephone Company in Erie.

NePage, McKenny & Company, 215 Oregonian building, Portland, Ore., with offices in Seattle, Spokane, Vancouver, B. C., and Victoria, B. C., have been awarded the complete electrical installation in the eight-story Pittock Block, now being erected in Portland for the Northwestern Light & Power Company. The contract amounts to approximately $16,000. Doyle & Patterson, Portland, are the architects, and the Brayton Engineering Company the general contractors.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Fishing Wires Into Conduits.

A job of wiring that I was engaged on a few days ago included several long lines of small conduits containing numerous rather short bends and few outlet boxes. We tried the usual methods of fishing the conductors into these pipes without success. Finally we hit upon the following scheme.

We connected up the hose of a vacuum cleaner, which happened to be a good one, to the remote end of the conduit and into the other end we fed a light cord with a small twisted piece of cloth tied to it. We found that by jerking the cord a little as the cloth plug reached obstructions the piece of cloth could be drawn through the pipe readily enough. Then it was an easy matter, of course, to draw in a heavier and stronger line and finally to pull in the wires themselves.

In some cases it is the best plan to use a very light cord or heavy thread with nothing tied to it at all; the moving air will carry it past the bends. In other cases it may be found necessary to use a bulky plug just small enough to slip past any obstruction in the pipe. Whether to use a thread or the plug is a matter that has to be determined by experiment. Clyde Mertz.

Installing Fixtures on Side Walls.

In putting up straight electric fixtures on wall brackets where the crowfoot is attached to the wall and the bracket screwed into it afterward, it very often happens that the fixture will become tight in other than the desired position —that is, it may become tight at the wrong angle with the floor. Any attempt to turn it into the proper position is liable to result in the twisting off of the stem. To avoid this difficulty I find it a good plan to proceed as follows.

I tighten the crowfoot on the bracket before hanging it, bringing the bracket into the desired position. Then, holding the crowfoot firmly in one hand I screw out the bracket with the other. If the crowfoot is then fastened in this position the fixture will become tight at the proper angle. R. A. Joseph.

Wiring to Fuse Bases

A No. 6 wire is the largest conductor allowed in the mains of branch cutouts without soldering the clips to the wire. Where I have a line of these cutouts to connect and it is necessary to have a greater capacity than 50 amperes—which is the Code rating of a No. 6 rubber-covered wire—I resort to the scheme shown in Fig. 1.

Beginning at the lug or connector of

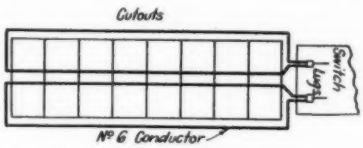


Fig. 1.—Plan of Wiring Bases.

the main switch or cutout, I run the wire down under the clips of the branch cutouts in the usual way. But instead of cutting the wire off at the remote end of the line of cutouts, I bring it up around the opposite side and carry it back to the same lug. Thus, the panel is fed from both ends and there is a main capacity of 100 amperes. This saves a lot of work and

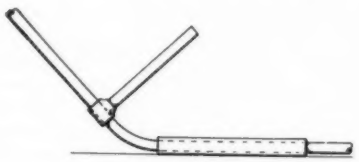


Fig. 2.—Bending Pipe.

makes a neater job than could possibly be obtained with the larger conductor.

Roy W. Eves.

A Note on Bending Conduit.

I have noticed on the kink page during the last few months descriptions of a number of schemes for bending the smaller sizes of conduit. The method which I employ in work of this sort I

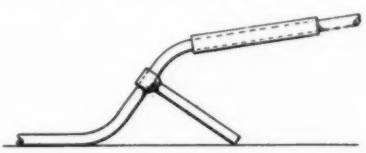


Fig. 3.—Another Way of Making Bend.

find to be far preferable to anything else I have heard of.

In my tool kit I carry an inch or an inch and a quarter pipe tee whenever I go out on a conduit job. It is usually easy to find a piece of pipe where the work is going on of the right size to fit into this tee, and such a piece of pipe I screw into the tee as shown in Figs. 2 and 3, making what wiremen usually call a "hickey." The hickey is used in the way indicated in the two figures. With this tool I can make bends that are much more difficult, and make them more quickly than with any other device I have yet seen.

I sometimes employ a second piece of pipe to slip over the conduit as a sort of sleeve while I am engaged in making the bends. While the use of this second pipe is not always necessary, it is sometimes a great help in securing neat, symmetrical curves.

The bending block is all right, of course, and no criticism of it is made here, but this hickey possesses the very desirable advantage of being easy to carry around in the tool kit.

W. R. Smith.

Tightening Wires in Cleat Work.

The good appearance of a job in which the wires are carried in porcelain cleats depends very largely on having the wires tight. The device described below has been found very efficient in securing this result, particularly when one is doing the job alone.

A slot about a quarter of an inch wide and half an inch deep is cut in the end of a hammer handle, so that the slot is at right angles to the head of the hammer. This arrangement is used in the following manner.

The cleat at the beginning of a run should be put in place and screwed up so as to hold the wires firmly. A second cleat is then put up about 30 feet from the first, or at the end of the straight run if the length is less than 30 feet, but this cleat should be tightened only enough to hold the wires after such slack as can be easily pulled out by hand has been taken up. The slot in the hammer handle is then placed around one of the wires and against the cleat on the side away from the section it is desired to tighten. Twisting the hammer head so that the handle turns toward the center of the cleat and with the side of the cleat as a bearing, the remaining slack is drawn through the cleat. When the wire is sufficiently tight the hammer head can be held with the left hand and the screw on that end of the cleat turned up with the right hand. The second wire is treated in a similar manner.

Cleats may then be installed at intermediate points and since the wires are already tight, the intermedite cleats are thus lined up without the necessity of measurement. It will be found that sufficient purchase can be secured to pull out ordinary kinks in wires up to No. 12 B. & S. gauge. Wires larger than this size which are badly kinked should be stretched out on the floor before attempting to put them in the cleats, but the slotted hammer handle will still be found helpful in pulling out the last few inches of sag.

H. S. Percival.

Public Service Commissions

MARYLAND.

A conference has been held between the engineering department of the Public Service Commission, officials of the Consolidated Gas Electric Light and Power Company and representatives of the electrical contractors doing business in Baltimore, over regulations for wiring buildings adopted by the Consolidated and about which there has been some complaint on the part of the contractors.

There was not much difficulty in reaching an agreement upon most of the points at issue, the only hitch occurring upon the question as to whether the Consolidated Company or the current user shall pay for the new type of switch that the company wishes to have installed. This is known as a "closed" switch as distinguished from the "open" switch now in use, and the company desires to install it in order to prevent thefts of current. The open switch costs 60 cents and the customer now pays for it. The new type, or closed switch, costs $2.50, and the company thinks the customer ought to pay for that also. Against this proposition the contractors protested, holding that the old type of switch serves all the purposes of the customer, and that the new switch is for the benefit of the company, and the company should therefore pay for it. The Commission will decide the point later.

The Public Service Commission has granted authority to the Consolidated Gas Electric Light and Power Company to issue $486,650 consolidated-mortgage debenture stock. The issue will be floated abroad by an English banking syndicate. The authority was supplementary to a general authority to issue stock given the company several months ago, with the proviso that the Commission must be apprised of the various amounts in which the new issue would be made.

MASSACHUSETTS.

Governor Foss has appointed Everett E. Stone, of Springfield, as a member of the Massachusetts Public Service Commission to succeed George P. Lawrence, who resigned after a few weeks' service on the board which went into office on July 1 last. The term is three years. Mr. Stone is head of the New England Construction Company of Springfield.

The Public Service Commission of Massachusetts has approved the location of tracks of the Bay State Street Railway in Turnpike Street in the town of Easton.

The Public Service Commission has extended the time for the construction of extensions of the Berkshire Street Railway in North Adams until December 1, 1914.

NEW JERSEY.

The Board of Public Utility Commissioners has approved of an ordinance passed by the Commissioners of Ocean City granting the Ocean City Electric Light Company permission to operate within the city. The ordinance ratifies the rights of the company in the streets of the city for a period of fifty years, and separates such company from the Ocean City Electric Railway Company, so that no failure on the part of either would work a forfeiture of the franchise of the other.

The Board has dismissed the complaint filed by the cities of Long Branch, West Long Branch and the Township of Eatontown against the Monmouth County Electric Company, contending that the company failed to furnish safe, adequate and proper service, and that the rate of fare charged on certain portions of the line is excessive. In its decision the Board points out that the rate of fare is not unreasonable, and that the company is complying with various recent recommendations of the Board for the betterment of its service.

NEW YORK.

A reason for refusing to supply electric current not heretofore brought to the attention of the Public Service Commission for the First District was developed at a hearing on September 16 on the complaint of the C. Perceval Company, against the New York Edison Company, for refusing to make a contract to supply current for a building now in course of erection at 2 Ninth Avenue. This property is owned by Vincent Astor, as are the premises next door, but in the latter building Frank L. Wing has a private electrical plant, from which the complainant expects to get current during certain hours of the day. An inquiry by the commissioner as to whether the Percevals intended to get Edison service only during the peak hours, when it would be least profitable, if not actually unprofitable, did not elicit any definite information. There being no differences as to matters of fact in the evidence submitted, the hearing was closed. Commissioner Maltbie, however, suggested to Nelson S. Spencer, counsel for the complainant, that he state in his brief if it might be the intention to get from the Edison Company segregated service only, for which the Wing plant would not supply current. Mr. Spencer argued that his clients are in a position entirely different from that of Frankel Brothers, who manufactured and sold current, but wanted breakdown service from the Edison. This complaint the Commission recently dismissed, holding that Frankel Brothers were essentially competitors of the Edison Company.

INTERSTATE COMMERCE COMMISSION.

The proposed bond issue submitted of the New York Central & Hudson River Railroad to the Interstate Commerce Commission, has been the subject of recent hearings. The investigation is the outcome of a resolution passed by the United States Senate on July 10, 1913, calling on the Interstate Commerce Commission to furnish to Congress all the facts and circumstances surrounding the proposed issue of four-per-cent mortgage bonds for $167,102,400.

Mr. Smith, senior vice-president of the New York Central, testified that for the finishing of the Grand Central Terminal and electric-zone work $30,000,000 will be required, for signalling and interlocking, $6,000,000. The $30,000,000 is considered necessary for providing a station to furnish the electrical operation and facilities for a very heavy and growing suburban traffic, which is a difficult problem at best; in fact, the entire traffic of the New York Central is increasing from 3 to 5 per cent a year. To put the interlockers in at Utica and Rochester will cost over $600,000.

Another work of the electrical zone is automatic train stops, with which they are also experimenting. Something like 40 or 50 have been tried out, and there is one device which looks promising.

The contemplated bond issue also contemplates the operation of trains in and out of New York by electricity for distances up to 33 miles. But no immediate action of this kind is contemplated for Buffalo, Chicago, or elsewhere, although, as Mr. Smith said, "it may have to come."

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 165.—Synchronous Motor for Line-Voltage Regulation.—A short time ago I heard of the use of synchronous motors on a transmission line to keep the voltage constant at the receiving end. Is this method dependable and is it much used?—N. P. T., Fort Wayne, Ind.

No. 166.—Relation of Tungsten-Lamp Efficiency and Life.—About what is the ratio of life of a tungsten lamp operated at an efficiency of 1.25 watts per candlepower to the life of a similar lamp operated at higher voltage so as to give an efficiency of 1 watt per candlepower?—B. K., Madison, Wis.

No. 167.—Thomson Double Bridge.—Please explain through your Questions and Answers department the Thomson double-bridge method of measuring and checking resistances, and give description and diagram of the bridge used.—H. M., Blandinsville, Ill.

No. 168.—Electric-Railway Crossing Signals.—Is it possible to arrange a series of highway-crossing signal gongs along a direct-current interurban railway that shall be operated by the line current when a car approaches the crossing without requiring any local batteries? If so, how is this done?—H. B. W., Erie, Pa.

No. 169.—Electric Meat Curing and Electric Tanning.—I would like to know where to get some information on the electric meat-curing and electric tanning processes.—A. M. B., Toledo, O.

Answers.

No. 158.—Negative Booster.—What is meant by a negative booster for an electric street railway? Does it lower the voltage when the load is light?—T. N. W., South Bend, Ind.

A negative booster does not affect the voltage impressed on the positive or trolley-wire side of the circuit. It is a generator put in series with a return feeder connected to the track at a point some distance from the generating station to give a negative boost, or sucking action to maintain the rail at ground potential. Where the track is used as a return circuit it often happens that under heavy load conditions portions of the track are many volts above ground potential, causing the returning current to stray from the rails to adjacent pipes, such as water and gas mains. This stray current produces an electrolytic action which soon damages or even destroys the pipes where the current leaves them. To prevent it some cities have passed ordinances requiring that there must never be more than seven volts difference of potential between the rails and adjacent water pipes.—F. E. V., Madison, Wis.

No. 161.—Wireless Receiver.—In a radiotelegraphic receiving apparatus, is there any kind of a protective device that will prevent unusual currents, such as are sometimes due to extraneous disturbances, from traversing the receiver?—J. M., Bayonne, N. J.

It has been stated by Dr. W. Austin, of the Radiotelegraphic Laboratory of the Navy Department that extraneous disturbances can be prevented from transversing the receiver by shunting it with a circuit containing silicon in contact with a crystal of metallic arsenic. This does not interfere with the reception of the regular signals. This device is also effective in the case of strong interfering signals. The best results are obtained with lost coupling and a considerable amount of inductance in the antenna, the crystal contact being shunted across only that part of the inductance which acts as the primary of the receiving transformer.—C. E. M., Washington, D. C.

The protective device in question is in existence in several forms. If the receiver proper is meant, that is, the telephone receiver used, there is the device of Mr. Pickard, which consists of a minute gap within the receiver shell so that a static disturbance such as mentioned is cared for without injuring the receiver. Where ordinary receivers are used it is known on rare occasions that damage results. If the receiver as a whole is meant, that is, the complete set, the writer believes that the Edelman "static killer' is as good as any. It comprises a special form of condenser and adjustable circuit-closer, the function of which is to care for the extraneous static disturbances so that the set is still operative and capable of caring for the regular signals. This last arrangement has been tested under severe conditions with good results. Choke coils can be utilized as an additional protection in the leads. The "static killer" is inserted in the circuit between the aerial and ground at the point where the leads enter the operating room and while it does not prevent the usual operation of the instruments, it is used only when necessary, as in the summer months, as the addition to the circuit is superfluous when the device is not needed.—P. E. Minneapolis, Minn.

I understand from your question that you wish to protect the receiver from exposure to sudden and momentary surges or impulses of high potential, rather than a continued difference of potential at the terminals. For this purpose I believe various forms of pinpoint spark gaps have been tried which were mounted within the receiver shell. However, probably the simplest and most effective protection may be obtained by attaching to each lug inside the receiver a short piece of silk or enamel wire, such as is used in the winding, and giving these two wires one or two twists about each other. This will limit voltages at the receiver terminals to that potential which is necessary to break down the insulation between these two protector wires, and which is probably below 100 volts or sufficient to protect the receiver from breakdown.—B. L. D., Arlington, Mass.

No. 162.—Electroplating Lead and Brass.—Is there any good method for electroplating lead or brass on copper and iron? I should like a formula for the solutions used.—R. H. P., Philadelphia, Pa.

The secret of obtaining good deposits of lead seems to depend upon the presence in the electrolyte of some organic substance known as an "additional agent." Glue is a good addition agent for an electrolyte consisting of lead acetate which has been made strongly acid by the addition of five per cent of free acetic acid. It is also good in fluosilicic acid solutions. Peptone is a good agent in lead perchlorate baths or lead acetate solutions containing ammonium perchlorate. The current density should be kept low.—E. L. C., Denver, Colo.

No. 163.—Parallel Operation.—I would like to see the following question answered by contributors to the Questions and Answers page. We have a three-phase, four-wire, 60-cycle, 220-volt, 200-kilowatt generator driven at 200 revolutions per minute through rope drive by a simple Corliss engine running at 79 revolutions per minute. There is a two-phase, 60-cycle, 6,600-volt transmission line connected to two 150-kilowatt transformers whose secondaries are Scott connected so as to deliver three-phase, 220-volt current to the switchboard. The engine regulates well enough to operate in parallel with a high-speed unit and the transmission line is "rock" steady. Can the generator be operated satisfactorily in parallel with the transmission line?—W. H. M., Hutchinson, Kans.

Since both systems are described as being apparently steady and since both have the same voltage, frequency and phase, there seems no reason why they cannot be synchronized and operated in parallel.—W. B. W., Chicago, Ill.

New England Section National Electric Light Association.

Annual Convention Burlington, Vt., September 17, 18 and 19

One of the most successful gathering of the New England Section, National Electric Light Association, was the fifth annual convention held at Burlington, Vt., September 17, 18 and 19. About four hundred members and guests were in attendance, including about forty ladies. A special train carried Boston and Southern New England delegations to Burlington over the Rutland Railroad, while many went by automobile. Transportation arrangements were ably handled by E. S. Mansfield, of Boston, and entertainment was in charge of C. C. Wells, of Middlebury, Vt. Convention headquarters were at the Hotel Vermont, where the guests on arriving registered with the secretary, Miss O. A. Bursiel. The sessions were held in Armory Hall.

On the evening of arrival occurred an informal reception and dance in the inclosed roof garden of the hotel. Officers of the Association, together with the chairmen of the various Committees, welcomed the visitors and a period of sociability was enjoyed.

The session of Thursday morning, September 18, opened with the reading of letters from Thomas A. Edison, J. B. McCall, president of the national Association, D. R. Street, president of the Canadian Electrical Association, J. E. Davidson, of Portland, Ore., E. C. Deal, president of the Southeastern Section, A. S. Dodd, of the Iowa Association, Van Dusen Rickert, Pennsylvania Association.

The report of the Executive Committee, read by President A. F. Townsend, Woonsocket, R. I., stated that five meetings of the committee had been held since the convention of October, 1912; that it is planned to hold one convention a year, in the early autumn, in future, and that a committee of eleven manufacturers and jobbers and five central-station men are in charge of "get-together" meetings, which will be held at intervals during the year.

R. W. Rollins, treasurer, presented the financial report, which showed receipts of $3,362 as refund payments from the National Association, expenditures aggregating $2,475 and a balance of $924. Mr. Rollins also read the secretary's report, which told of the successful campaign for new members, as the result of which 90 members have been added, making a present total of 869, of whom 117 are Class A, 512 Class B, 13 Class C, 52 Class D, 175 Class E. The secretary has sent out 15,000 pieces of mail matter during the year, among them being the newly printed constitution and by-laws. Attention was called to the well equipped headquarters maintained by the Section in the Lawrence Building, Boston, and members were urged to avail themselves of the publications there.

The annual report of President Townsend called attention to the improved financial condition of the Section, which has resulted from the omission of the formerly customary spring convention. It was pointed out that the National Association with its 12,500 members is the largest organization of its kind in the country, and represents 90 per cent of the investment in the industry. The New England Section is the only one having a permanent office and secretary. Further efforts are to be made to add to the membership, and 69 central stations are yet without affiliation with the Section. There are also 50 good Class B prospects, employees of Class A companies.

R. S. Hale, for the Rate Committee, reported that the committee is cooperating with the Rate Committee of the National Association.

Central Stations in Small Towns.

The first paper was by A. B. Marsden, Manchester, on "Problems of Central-Station Managers in Towns of Less than 5,000 Inhabitants." According to statistics, the speaker said, more than 4,000 of the 5,927 central-station plants in the United States are in towns of 5,000 inhabitants and under, while 3,200 are in communities of less than 2,500 people. Many of these smaller Companies are members of the National Electric Light Association, but a large number fail to join the Association because of the impression that the organization is of particular benefit to the larger companies. The managers of small companies find little to interest them in recitals of elaborate accounting systems or business plans applicable only to large cities. The bulk of their business has to do with the installation and energy supply of household and store lighting and the simpler domestic electric appliances. In New England especially the central-station man of this class is liable to become confined to a narrow groove. Though the Association is doing its utmost to interest him in becoming affiliated with the organization, too many are neglecting a great opportunity for benefit. The addition of many members of this sort would benefit the Association; and bring them in touch with supply men. Class E members should endeavor to bring central-station men into the organization for mutual benefit. Class A members can also bring their influence to bear to induce fellow central-station managers in neighboring communities, whom they have perhaps helped out of difficult emergencies, to join the Association. Bringing such men to conventions as guests often results in their becoming members. It is noteworthy that resignations from Class A are few except in cases where companies have lost their identity through consolidation. The speaker held that there is today a large field for the activities of the New England Section. The Association to be wholly efficient needs to include in its membership the whole field of the industry.

A general discussion followed, led by T. Commerford Martin, secretary of the National Electric Light Association, who pointed out the desirability of the smaller companies becoming affiliated with the Association. He showed that such members receive, in the value of the publications distributed, a full equivalent of the $5 membership fee. There is still a large opportunity to add members of this sort. Four thousand of the smaller companies are as yet unconnected with the organization. Though current report would lead to the surmise that consolidation of lighting properties was general and extensive, only about 1,000 companies of the nearly 6,000 in the country have been consolidated. While 30 companies have been lost from the National Association through this cause, about 100 new member companies have been gained. Progress in national work was touched upon. In the Northwest, five states are joined in a section association that bids fair to rival the New England Section, at present the largest in the country. Recently the formation of the Southeastern Section, with 250 central stations, was effected at Macon, Georgia, while some fifteen new applicants in West Virginia are expected to ally themselves with organizations in adjoining states. Mr. Martin explained the advantages of the Question Box to managers of the smaller companies. Correspondents in 300 central stations furnish information gained from practical experience, and this is forwarded promptly to questions. Contrasting western enterprise with New England's traditional conservatism, and indicating the large field still to be occupied by central stations

in the East, Mr. Martin pointed out that many western communities of barely 1,000 population are served with lighting facilities in every house, while many of the larger centers show almost as general a use of electricity. In Vancouver, B. C., there are 38,000 meters on the consumers' circuits.

Wilfred Smith, Woodstock, Vt., commenting on the Question Box, suggested that blanks be furnished for entering data in reply to inquiries for the Question Box.

Eugene Carpenter, Oak Bluffs, Mass., held that a large man, with diversified ability, is required to handle a small company. Such a manager has one advantage—he collects the bills and thus comes into close relations with his customers. Mr. Carpenter objected to the practice of large city companies in advertising their low rates, which come to the attention of the consumers in the smaller towns and cause dissatisfaction. The electric light solicitor should explain the cost of service in terms of average monthly price rather than of price per kilowatt-hour, which means nothing to the layman. Mr. Carpenter advocated the policy of a small lighting company purchasing energy from any large company that will furnish it more cheaply than it can be generated locally; that one should capitalize extensions to plant and not put earnings into capital account. An interesting system of repair facilities was described. Each superintendent of the several local companies under Mr. Carpenter's direction has an automobile with space in the rear for transporting material. A trailer is drawn behind with capacty of 1,200 pounds. The cost of fuel, oil and depreciation is figured at five cents per mile per car.

H. R. Wilbur, Franklin, Mass.; W. P. Schwabe, Windsor Locks, Conn.; L. D. Gibbs, Boston; W. D. Jennings, New Haven; A. L. Pierce, Wallingford, Conn.; W. G. Stetson, Boston, and H. A. Sawyer, Emesbury, Mass.; also participated in the discussion.

Line Extensions.

The next paper was by Alexander Macomber, of the Charles H. Tenney Company, Boston on "Principles Governing Central Stations in Line Extensions, and Rulings of Commissions Thereon." The paper dealt only with those extensions which were not expected to be immediately profitable but had prospective value as revenue producers. Central stations to the number of 114 were interviewed, 80 responding. The responses to inquiries showed that almost every company had a method if its own in dealing with the matter. Treated generally, the responses are classed as follows: Extensions made with assistance of customer, 58; extensions made as matter of policy or in hope same will become profitable, 14; extensions not considered, 8. Twenty-six of the 80 companies require the customers to pay all or part of the first cost; 12 of these concerns rebate the money advanced, either in a lump sum or a per cent of the gross earnings of the extension or of the customer's monthly bill. Twenty-three of the 80 companies favor obliging the customers to only guarantee an income; 15 of these base this return on the cost of construction, while 8 require interest and depreciation varying from 10 to 50 per cent and averaging between 20 and 25 per cent, this guarantee running two to five years. Ten companies require the customer to pay all or part of the cost of the extension and to guarantee the income as a certain per cent of the cost, this per cent being 20 to 25 per cent. In 14 cases extensions of merely prospective profit are made when there is reasonable assurance of ultimate profit, and sometimes as matters of policy, the customer not assuming any obligation. Eight companies make no extensions that would not be profitable from the start, maintaining that a central station should do no part of its business at a loss. Various considerations, however, are likely to modify this attitude. The attitude of state commissions on the subject has not had wide expression as yet. A decision of the Ohio Public Service Commission required a lighting company to furnish service to applicants where an extension of line was required, which the company wished to have the customers bear the cost of installation. This decision hinged on the terms of the franchise from the community. Mr. Macomber referred to Prof. Bruce Wyman's treatment of the general subject in a work entitled "Public Service Corporations," in which the principle is recognized that a lighting company may properly be expected to push its service facilities into fields not immediately profitable, to meet growing public demands, but is not under obligation to accede to unreasonable demands in individual cases. Though it is hard to arrive at any standard for action, the author finds one company's practice reasonable, this being to make extensions where a gross income of $533.33 can be gained on an extension costing $1,000. Capital and depreciation should return 16 per cent, or $160. Assuming the operating ratio to be 70 per cent of gross, the 30 per cent remaining for interest and depreciation would, on the gross income of $533.33 yield $160 on $1,000 outlay. The problem of a reasonable return on investment, the writer held, should have regard to a broad interpretation of a company's obligations to the community.

A lively and interesting discussion ensued. D. S. Boyden, of the Boston Edison Company, held that a company should avoid doubtful extensions and remember that unprofitable outlays of this character affects the customers as a whole in making the general service more expensive. Central stations should not construct on unaccepted streets or on private land except where protected by easements, and should include in the cost the factor of added station equipment and reconstruction. The best method was thought to be to require an agreement from prospective customers to be served thus, guaranteeing a suitable return, and having succeeding customers come in on the same agreement to the original customer's advantage.

R. D. Coombs, of New York City, pointed out the advantages of transmission-line extensions on private rights of way, in view of the increasing supervision of commissions over lines on public ways. The work of the Standardization Committee of the Association was commended as being instrumental in adjusting difficulties between companies and commissions.

Levin J. Chase, Concord, N. H., said that with the companies in smaller communities the demand of farmers for extensions were often embarrassing. Often a line that many people seemed interested in would be utilized by only one or two customers. The test of the farmers' interest was found to be whether they were ready to put their labor into supplying and setting the poles for such a line. When they would not do this much, the project was abandoned.

C. R. Hayes, Fitchburg, Mass., called attention to the minimizing of cost by co-operation with telephone companies in the use of poles.

A. L. Pierce, Wallingford, Conn., spoke of the work being done by a committee of the National Association of Municipal Electricians in fixing standards of line construction.

W. P. Schwabe, Windsor Locks, Conn., called attention to a decision of the Wisconsin Commission which held that a Beloit company was not warranted in making unreasonable and unprofitable extensions. A Maryland case was also cited, in which a realty company was required to bear the cost of an extension until business in a new town site yielded a profit to the lighting company. Mr. Schwabe's company required a $2 monthly net return on a $200 extension, this representing 6 per cent interest and 6 per cent for depreciation.

President Townsend said the Woon-

socket company avoids making extensions with customers' help owing to the Rhode Island law which forbids this method, but that where community growth makes it appear desirable, extensions are being made at the company's expense, those involving an outlay of $500 or less being made without question.

E. F. Lawton, Hartford, said that his company extends residence lighting circuits wherever street lighting is called for. Mr. Boyden said the Edison Company of Boston makes an investment of $75 for a customer or for street lighting, this exclusive of meters and transformers.

Mr. Macomber, in closing, said local conditions must finally determine. It was pointed out that the Vermont Commission requires a company to apply to itself for any extension whatsoever, and regulation is likely to be more general and rigid in all states in future.

Electric-Appliance Merchandising.

The first paper of the Thursday afternoon session was by W. G. Stetson, of the Edison Electric Illuminating Company of Boston, on "Some Phases of Electric-Appliance Merchandising." The author noted the gradual departure from the former attitude of companies toward the appliance business, of regarding that department as a side issue rather than an important branch of the business. Central stations are coming to see that the increase in load through the sales of appliances is very desirable. Dividing the subject into four heads, purchasing, advertising, selling and service, Mr. Stetson took up the subject in a practical and interesting manner. In the matter of purchasing electric appliances the average man finds himself at a loss to understand how he can buy an appliance of a manufacturer or wholesaler as cheaply as he can buy it of a retailer. The central station's attitude that the more people selling devices the better for their business makes an exception in the case of retailing by manufacturers and wholesalers. The speaker held that sales would be greatly increased if the latter refrained from retailing. The policy of some central-station salesmen of being neutral in their attitude toward appliances of various makes was criticised. The best makes should be selected and pushed. On the subject of advertising, a live window, arranged by a trained window dresser is essential. Appliances should be exhibited in the same atmosphere as that in which they are to be used. Have all the devices accessible to the customers, rather than closely kept in cases. Seasonable advertisements, with reduced-price and bargain-price sales occasionally, are essential. The selling of electric appliances requires trained persons who can instruct the public in the value and economy of the various apparatus. Service, on the part of a retail store which sells such devices, must include following up sales by seeing that the appliances are kept in use by the purchaser. In this respect the central station has the advantage, but it is equally important that independent dealers give careful attention to this matter to insure repeat orders or the adoption of other kinds of devices by their patrons.

E. M. Addis, Brattleboro, Vt., held that a central-station salesroom should give a range of choice to the customers, not specializing in any one or two makes of appliances. Many smaller companies could not afford to have a display window. Mr. Stetson replied that no company can afford not to have a good window display. It is well, he said, to push three or four makes of certain devices, but not a dozen.

R. P. Ingals, of the Simplex Electric Heating Company, said that the manufacturer's price of flatirons now enables the central-station to sell them at good profit. Independent retailers of ranges are given small opportunity to sell this class of appliance at a profit because of the central-station's eagerness to make sales. He held that dealers and stations should get together and agree on prices that would yield a suitable return. It is best for the station to sell at a fair profit and put that profit into advertising.

E. L. Cooley, General Electric Company, held that the central-station is the proper medium for the sale of appliances. The relation of the customer is intimate, making the station the natural resort for advice. The manufacturer of the best goods will win, despite favoritism on the part of dealers.

J. T. Shannon, Waterbury, Conn., thought central-stations were not improving their opportunities; their salesmen are not fully educated in sales methods. Window displays with a change twice weekly are vital to success.

C. B. Burleigh, General Electric Company, Boston, objected to the term "current-consuming devices." It counted dollars out of pocket for the user. Central-stations should push only the best appliances.

President Townsend held that central-stations should take care of appliances whether sold by them or by dealers. His company in Woonsocket has an inspector who makes yearly adjustments, and a demonstration is to be employed to explain the fullest uses of apparatus.

L. D. Gibbs, Boston Edison Company, held that all employees of a lighting company should have electricity in their homes, and have in use all modern devices. The wives and even the children should be familiar with their use. Mr. Gibbs thought it desirable that the small central-station specialize along some definite line rather than attempt too many branches.

Electric Vehicles.

The paper on "The Value of the Electric Vehicle to the Central-Station," by W. H. Snow and David W. Beaman, New Bedford, Mass., and read by Mr. Beaman, pointed out the large source of revenue that the increasing adoption of the electric motor car is bringing. This class of business provides a greater per cent of income than all others. The average consumption of energy of passenger electrics is from 100 to 200 kilowatt-hours per month and of a one-ton truck about 400 kilowatt-hours a month. Cooking and heating apparatus are used for short periods during the day and early evening, but charging can be done after the power load has been discontinued and the lighting curve has begun to flatten out. The introduction of the Mazda lamp and the practical establishment of the power load leaves the vehicle the great means of expansion in central-station business. At present there are 1,500 electrics in New England—967 passenger and 583 commercial—this representing a growth of 100 per cent for the year in some of the cities. But New York City and Chicago each has more electrics than all the New England states combined. Extracts from letters from users of electrics in the country formed a large part of the paper. Manufacturers, teaming concerns, machine companies, railroad and other transportation companies furniture dealers, bakers, commission merchants, millinery dealers and central-station companies endorse the electric commercial vehicle and in many instances indicate their intention to add to their fleets from time to time. Users of pleasure vehicles also express their satisfaction in their cars. Figures showing the size of some of the electric fleets in use in New England were given as follows:

Edison Electric Ill. Co. of Boston.	76
American Express Co., Boston....	34
Ward Baking Co., Cambridge, Mass.	33
General Electric Co., Lynn, Mass.	25
Adams Express Co., Bridgeport, Conn.	21
National Express Co., Boston.....	13
W. W. Walker Co., Hartford, Conn.	21
New Bedford Gas & Edison Light Co., New Bedford, Mass.....	10

United Electric Light Co., Springfield, Mass.	9
Friend Bros., Lowell, Mass.	8
Hartford Electric Light Co., Hartford, Conn.	8
J. E. Cousens Coal Co., Boston	7
Pacific Mills, Lawrence, Mass.	7
Pureoxia Co., Boston	7
United Illuminating Co., New Haven	7
Worcester Electric Light Co., Worcester	6
Boston Rubber Shoe Co., Malden, Mass.	5
Geo. W. Gale Lumber Co., Cambridge	5
Houghton & Dutton Co., Boston	5
Malden Electric Co., Malden, Mass.	5
Winchester Repeating Arms Co., New Haven	5
Total	321

Records of the New Bedford lighting company's 10 electric automobiles show mileages of 12.5 to 31.8 per day for trucks of 1,000 to 7,000 pounds capacity, with energy consumption of 0.39 to 1.93 kilowatt-hours per mile. It was urged that every central-station put one or more electrics in service, both for use and to furnish data to use in urging customers to adopt this economical means of transportation.

R. W. Rollins, Worcester, Mass., told of his company's efforts in introducing the electric vehicle. It was found to be somewhat more difficult than to introduce domestic appliances. In Hartford 35 or 36 electrics had been introduced in a year.

Fred H. Smith, superintendent of the Worcester company, gave detailed cost per mile for 14 trucks. A two-ton truck costs 23.3 cents per mile on a three-cent rate, a half-ton service truck costs 29 cents a mile, and a half-ton service truck running 20 hours per day cost, for July, 7 cents per mile, for August, 5.5 cents. Three runabouts showed costs of 18.7, 23 and 10 cents, while other cars used by heads of departments cost to operate 8, 5.5, 12 and 4.8 cents per mile. Two cars used in transporting line men covered 1,325 and 1,200 miles last month, reducing the cost of work materially.

J. A. Hunnewell, Lowell, Mass., told of good results from two runabouts used by his company. Four trucks are also in use. Time of employees has been saved, value of which nearly offset the cost of operating the cars. Four trucks were recently bought by a textile company; these are charged at the mill's generating station. W. M. Thayer, Hartford, said ten electrics were in use by the company.

H. A. Skinner, Providence, raised the question whether the stations should charge the same rates for charging as do the garages. In his city the rate for this service is five cents per kilowatt-hour.

W. A. Holmes, Cambridge, Mass., said his company now has in use two Waverley, one Rauch & Lang, one Walker, one Bailey and two General Motors Company trucks. The Rauch & Lang car since equipment with Goodrich electric tires, has done good service. The Bailey is satisfactory. The Waverley chassis with locally constructed body, carrying Edison batteries, gives little trouble and is very efficient. Mr. Holmes advised having a driver for each type of vehicle. Troubles he found due chiefly to diversity of operation. He is reducing the company's stables and will ultimately operate electrics exclusively.

J. T. Day, Malden Electric Company, told of excellent results obtained from the use of six electric vehicles, four of which work over 18 hours per day.

J. S. Codman, Bailey Electric Car Company, pointed out that charging a truck will yield more revenue to a central-station than supplying energy for lighting an average house. The use of pleasure cars will be greatly increased, he said, by the increase of charging facilities. Already cars are run 75 to 100 miles on a charge at gasoline-car speed. The dearth of charging facilities in Vermont was commented on, there being only one station ready to charge at all times. He finds that station managers are ready to meet the situation when they learn its opportunities.

E. W. M. Bailey, Amesbury, Mass., told of the phenomenal run he had made from his home to Burlington. The trip was made over an unfamiliar route, the distance 258 miles, during parts of two days at an average speed of 19 miles per hour. Part of the trip was covered at an average speed of 21.3 miles per hour. No adjustment or repairs were required or made on the way, and there were difficult road conditions to contend with. The car was a Model E, Bailey roadster, equipped with 60 cells Edison battery, A-5 size. It is a car that has run 10,700 miles during the past 11 months. The car was given a normal charge on leaving Boston and partial charges were taken at five places, at rates varying from 30 to 150 amperes. The total running time was 13 hours, 35 minutes. Colonel Bailey said that the performance could be improved on repetition. He had never visited any of the towns en route except Fitchburg, Mass. With more frequent charging facilities, a lighter battery could be carried.

E. S. Mansfield, Boston, said that in that city the public is coming to believe in the electric vehicle. Every intelligent user is enthusiastic. The sale of every new car makes successive sales easier.

Day Baker, General Vehicle Company, Boston, said that costs per mile do not represent the test of whether the electric should be adopted; it is, rather, quality of service. It does not matter greatly whether the charging rate is 1.5 cents or 5 cents per kilowatt-hour. Refering to Mr. Holmes' description of a service wagon of which the body was home-constructed, Mr. Baker stated that vehicles for this work are now built by manufacturers. The central station should aid in the electric-vehicle campaign for the sake of its revenue. Announcement was made that a lighting syndicate is soon to initiate a campaign for the adoption of electrics at all its plants. Gimbel Brothers, New York, who formerly employed electric delivery wagons and later went over to gasoline cars, are again using the electric for both delivery and trucking. Tribute was paid President Edgar and General Superintendent Atkins of the Boston Edison Company for their valuable aid in promoting electrics in the Boston territory.

The meeting passed a resolution endorsing the electric-vehicle work, and providing for a committee to promote it.

Co-operation.

The session of Thursday evening was given over to a symposium on "Co-operation of Allied Electrical Industries," the subject being considered from the viewpoint of manufacturer, jobber, contractor, and central station. S. St. John Morgan, of the Westinghouse Electric & Manufacturing Company, Boston, took up the first phase of the subject.

We are all striving for the increased use of electric current, he said. The early stages of the electrical industry saw little co-operative effort, but the keynote of present-day business is the get-together idea. Electrical men are uniting forces to teach the public the newer uses of electricity in the home, and to establish in the public mind a friendly feeling toward public utilities, manufacturing companies and the industry as a whole. The public is being taken into confidence. Few realize how dependent they are on the use of electricity, but additional uses are constantly at hand. Education of the public is being carried on in the advertising of manufacturing companies. Much of this matter bears broadly on the general use of the energy. Dealers, contractors and central-stations should supplement this advertising with local efforts along similar lines. The national advertising will awaken the interest while the local campaigns will secure the sales. The central-sta-

tion is probably the greatest gainer from any movement which promotes the use of electricity, as the revenue is a constantly recurring one. Real-estate men and architects should be educated to utilize the advantages of electricity to the utmost. The public should be led to know the current electrical terms as familiarly as they know the points of an automobile. The manufacturers of all electrical appliances are doing a great work in furnishing literature for free distribution by stations and dealers. Some manufacturers provide moving-picture films for display at parks and theaters. To extend this work, jobbers and contractors should talk and preach electricity on every occasion, suggesting the addition of receptacles in houses under construction, for a fan, table, stove, radiator or other device. Central stations can win favor by loaning resuscitation apparatus, and fans for hospitals. The aid of newspapers should be invoked to do away with the false statements often circulated that fires of unknown origin are caused by "crossed wires" or "defective wiring."

The next paper, on "The Jobbers Co-operative Methods," was by W. J. Keenan, Pettingell-Andrews Company, Boston, and read by L. D. Gibbs. The outstanding argument was as follows:

The central-station that competes actively in selling electrical appliances is not acting in the spirit of co-operation. If a station does sell such goods it should do so at a fair profit. The future growth of the use of household appliances will come to equal the lighting load in many plants. The free distribution of lamps or their sale at less than the regular price is harmful, in that the consumer comes to feel that the company is well able to grant this concession. The policy is condemned on business grounds because no station can afford to do business at cost or less, and if a loss is made in one channel it must be made up elsewhere. The accounting system of a station should indicate the facts; a company places itself in an awkward position before the public and the commissions when it admits that its rates are high enough to enable it to give away supplies. Central-stations should fix standards of quality of lamps and appliances that may be connected to their circuits, that may easily be folfowed by jobbers and contractors. The jobber is a necessary link in the business in that he handles the entire line of the user, station and contractor and gives the manufacturer the channel by which his goods can best reach the consumer. Without him the industry would not have reached its present high state of development.

The next paper dealing with the contractor's view of co-operative methods, was by John A. Gilliland, New England Engineering Company, Waterbury, Conn., and was read by Mr. Gibbs. This paper will be found reprinted in full in another part of this issue.

The central-station's attitude toward the subject was expressed by Francis A. Gallagher, Jr., Narragansett Electric Light Company, Providence, R. I. He said in part:

The central-station interests believe that the public today looks to them for a service beyond that of simply furnishing electricity. That service may be anything from the delivery of a few Mazda lamps, the demonstration or repair of a current-consuming device, to free engineering service on a complicated power installation. The demand of the public for this service makes it necessary to continue the present policy for a time at least. Manufacturers, jobbers and contractors have no vital interest in appliances once they become the property of the customer, while the station is obliged to keep them in working order. Central-stations must consider carefully whether the policy of selling appliances at cost is not a dangerous one. The renewal of lamps involves a factor in producing the best illuminant possible, and may render the free or cost method of sale or exchange justifiable.

The general discussion which followed embraced the whole subject presented. H. E. Page, Hartford, said that long credit given by jobbers to contractors is an evil. The central-station should confine itself to the sale of current, like the New York Edison Company. R. W. Rollins advocated the various agencies getting together and standardizing the prices of appliances. H. T. Sands said: "This is a day of specialized effort. Lamp service must come first with the station. All branches of the industry should confine themselves to definite channels and make an equitable division of the fruits."

C. B. Burleigh advocated the term "current-utilizing devices" for "current-consuming devices." Lighting companies should teach and encourage the practice of economy of current by consumers. John J. Myer said that in the efforts toward co-operation the public had been ignored. Almon Foster, Boston, held that each branch of the industry should keep to its particular field.

Eugene Carpenter thought "electric conveniences" a better term than "current-utilizing devices." The conveniences of operating these appliances should be the feature emphasized, and the operating cost touched upon lightly.

Relation of Central-Station and Its Customers.

Friday morning's session opened with a paper by J. T. Shannon, of the United Electric Light & Water Company, Waterbury, Conn. The subject was, "The Relation of the Central Station to Its Customers." This paper is presented on page 611 of this issue.

Discussion of this paper was led by Howard T. Sands, of the Tenney Companies, Boston, who approved the sentiments of Mr. Shannon. In adjusting a meter bill, said Mr. Sands, let is be clearly understood that the concession is made to satisfy the customer rather than because it is his due. A case was cited in which lights in a large store were left burning all night through the carelessness of clerks. The proprietor asked for a discount for the energy expended without value to himself, and a discount of $50 was finally offered by the lighting manager, but when the matter had been carefully considered the store-keeper declined to accept the concession, realizing that the fault was not in any way that of the lighting company. Mr. Sands said that the use of the expression "our rule" in connection with the adjustment of bills is highly objectionable to customers and should never be used. Companies do well to employ high-class help as meter readers, paying $15 to $18 per week.

Herbert W. Moses, of the Boston Edison Company, told of the welfare work being carried on by that company. Continuity of service tends to the highest efficiency of employees; hence the desirability of securing and retaining the best help obtainable. The company inaugurated on February 1 an employment department with superintendent, medical director, librarian, clerk, inspector and stenographer. Applicants for positions numbered 1,566 to June 30. The physical examination resulted in the acceptance of 435 of the 497 examined. During the year prior to June 30, 837 employees left the company, of whom 472 resigned and 365 were discharged; 1,002 employees were added. On February 1 a system of sick benefits was put in effect, in addition to accident and death benefits already in force. Accident benefits for the year to June 30, amounted to $4,201, death benefits for nine month previous to $2,917, and sick benefits for the five months, February-June, $2,534; 878 patients were attended. Accidents for the year numbered 720; 450 to employees, two of which were fatal, 270 to outside employees engaged in construction work, nine of them fatal. Monday afternoon was the time of the largest number of accidents. The company has a fund from which employees may borrow sums of $100 at a time without interest. An accident-prevention committee, one member from each large department, is studying the cause and prevention of accidents.

The company publishes a monthly magazine, *Edison Light*. In June a field day was provided for all employees, at a cost of over $5,000 to the company. Plans for a clubhouse, library and recreation grounds in connection with the new service station are being put into effect. The Edison Company expended about $30,000 in the welfare work the past year, and expects to spend $50,000 the coming year. The results are an improvement in the grade and efficiency of employees, and less absences for sickness. The employees contribute nothing to the work, but the company assumes no attitude of paternalism toward the workers.

C. H. Ingalls said that employees in dealing with the public should be charged not to "bluff." If they could not explain a matter they should report it to the manager for explanation. F. H. Smith advocated the arrangement of a company's office which allowed the public easy access to the superintendent and manager.

Socket and Lamp Voltages.

The closing paper of the convention was on "Socket Voltage versus Lamp Voltage," by Henry Schroeder, General Electric Company, Harrison, N. J. He said in part: The so-called voltage of a lamp is the voltage which should be applied to give the proper efficiency, life and candlepower determined when considering the renewal cost of the lamp and the cost of energy. The rated efficiency, candlepower, watts, life, etc., can be obtained only when the socket voltage is the same as that marked on the lamp. The term "watts per candle" is often confusing because the higher the efficiency of a lamp the lower the watts per candle. Increasing the efficiency of a lamp of given quality decreases the life, and as the total cost of lighting is the cost of lamp renewals plus the cost of energy, the lamp-renewal cost being but a small part, it is important to operate lamps properly in order to obtain light at a minimum cost. This benefits all concerned, the consumer, central station and manufacturer. The customer gets more for his money. For example, a 100-watt Mazda lamp operated four volts low means he is losing 11.5 candlepower but saving 5.8 watts. In order to get the full amount of light he is entitled to in a 100-watt lamp, it would be necessary to burn a 15-watt Mazda lamp in addition, and the slight saving in cost of renewals does not offset the extra energy cost of the 15-watt lamp. To the central station it means that as the customer in the above case would not burn an extra lamp such as referred to there is a loss of almost six per cent load that the station would obtain if the lamp were operated properly, and the customer is not getting the light he is entitled to. When tungsten-filament lamps were first introduced the practice was general of adding a few volts to the circuit voltage in specifying lamp voltage. This was perhaps due to lack of confidence in the lamp, to compensate for breakage and early burnouts, by obtaining long burning of the remaining lamps. The greatly improved quality of the present drawn-wire Mazda lamp and the very conservative rating given by the manufacturers makes this practice undesirable and it should be abandoned. Long life is not a criterion of a lamp's quality, unless the efficiency at which it burns is known to be what it ought to be. An investigation of many central stations has shown that it is the actual though perhaps unconscious practice to operate lamps at two to five volts below their rated voltage. If managers realized that Mazda lamps are now giving lives well in advance of their rating, and that for every volt on the circuit 1.5 per cent extra revenue can be obtained, this practice would not continue, so it would seem that they are only limited in raising the voltage to the convenience of renewals by their customers. At a 10-cent current rate, 100-watt Mazda lamps would be most economically operated at six volts above their labeled voltage, even when lamps are paid for at list prices, and the frequency of renewals would be about the same as would be with carbon lamps renewed when they had depreciated to 80 per cent. A careful investigation of the customers' socket-voltage conditions is desirable, in order to increase revenue and give better lighting service. Frequently the station voltmeter reads two to four volts high, and as the voltage drop on the lines is generally not measured, these two, together with the drop from the service switch to the customers' sockets, should be tested often. With the usual growth in load each year the drop in voltage is likely to be much greater than is supposed. Mr. Schroeder went on to say that it is no longer necessary to order lamps above the circuit voltage. Tests on a typical installation gave a maximum voltage reading of 116, minimum 108; average 112. In this installation 115-volt lamps were used. The average voltage was three volts below normal for these lamps. The central station lost five per cent in revenue and the consumer lost ten per cent in candlepower. The quickest way to stop these losses in revenue is to raise the central-station voltage.

Mr. Schroeder spoke of recent progress in the development of the nitrogen-filled lamp. Two advantages and one disadvantage are found. The advantages are, that a pressure is put on the filament which keeps it from evaporating, and the gases circulate due to the heat, eliminating all blackening at the neck of the bulb. The disadvantage is that the filament is cooled by conduction. The nitrogen-filled lamp is no better than the chemically filled lamp until the four to five-ampere sizes are reached. Lamps with an efficiency of one-half watt per candlepower have not been successfully built in less than 15 to 20-ampere sizes. For street lighting the General Electric Company is developing 500 to 1,000-watt lamps of 20 amperes rating, using current transformers at the lamp to obtain the necessary 20 amperes from the 6.6-ampere series circuit. Sixty and 40 candlepower street series lamps are being studied for nitrogen development in the interest of higher efficiency, as is a line of 110-volt nitrogen-filled lamps. Under 500 watts as good efficiency cannot be obtained in a nitrogen-filled lamp as with a standard Mazda lamp for 110-volt service. It seems impossible to overcome the cooling effect of the gas on the filament. An efficiency of 0.55 watts per candlepower can be obtained in the 1,000-watt, 110-volt, nitrogen-filled lamp and of 0.5 to 0.70 watt per candlepower with a life of 1,000 to 1,500 hours from the 750-watt nitrogen-filled lamps.

F. W. Prince, Hartford Electric Light Company, said that company is operating 25 to 60-watt tungsten lamps below manufacturer's recommendation in order not to increase the customers' bills unduly, in making the transition from Gem to Mazda lamps. Thus the 40 and 60-watt lamps are run at 1.12 watts per candlepower as against the manufacturer's suggestion of 1.17. With free renewals of 60-watt Mazda lamps and a life of 1,700 hours, a lamp nets the company 8.55 cents per kilowatt-hour after deducting renewal cost. If operated at the manufacturer's high efficiency rating it would net 8.25 cents per kilowatt-hour. Before April 1, 1913, the company installed 121 25-watt lamps to every 48 60-watt lamps, but since that date when free renewals of 60-watt lamps have been in force, 91 25's are installed to every 169 60's.

S. R. Keyes, Boston Edison Company, said the manufacturer is a little conservative in rating lamps today. His company operates 6.6-ampere series tungsten lamps at 6.7 amperes and obtains 1,000 hours' life and only 10 per cent drop in candlepower.

Mr. Schroeder in closing said that if the customer is to get all he is entitled to the lamps must be operated at rated voltage or higher. If the bills are increased, he gets light more than commensurate with the added cost.

Election of Officers.

Officers for the ensuing year were chosen as follows:

President, C. C. Wells, Middlebury, Vt.

Vice-president, L. D. Gibbs, Boston.

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Executive Committee (one member for each state), H. B. Ivers, Portland, Me.; L. J. Chase, Concord, N. H.; A. B. Marsden, Manchester, Vt.; E. P. Rowell, Plymouth, Mass.; E. A. Barrows, Providence, R. I.; B. H. Gardner, Waterbury, Conn.

PACIFIC COAST CONVENTION OF AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

Report of Meeting at Vancouver, September 9, 1912.

The Pacific Coast Convention of the American Institute of Electrical Engineers opened Tuesday morning, September 9, with registration and an informal reception at the Odd Fellows' Hall, Pender and Hamilton Streets, Vancouver, B. C. At 2 p. m. the regular sessions were opened by a speech of welcome by Alderman Brown. Vice-president Lighthipe was then introduced by Chairman Haywood, as the Pacific Coast representative of the Board of Directors.

C. F. Uhden, of Spokane, chief engineer of the Washington Water Power Company, read the paper by V. M. Greisser entitled "Effects of Ice Loading on Transmission Lines."

Ice Loading on Transmission Lines.

Wires hung from suspension insulators do not maintain their relative positions as closely as when pin-type insulators are used, owing to the deflection of the insulators with unequally loaded span. During the winter season a transmission line of the Washington Water Power Company was rendered almost useless due to short-circuits caused by the stretching and sagging of the wires when unequally loaded with ice, which falls from some spans sooner than others. A series of tests upon an experimental line was made to determine (1) the influence of the loaded line upon the elasticity of the cable; (2) the effect of swing of insulators; (3) the effect of using strain insulators at short intervals, and (4) the combined effect of these conditions. The manner of making the tests is described and the results are shown graphically.

J. B. Fisken, of Spokane, opened the discussion upon request, stating that as he was the designer of the original line he did not like to discuss it in detail. He called attention to the fact that the direction of the wind had considerable effect on the formation of ice, as wires strung in the direction in which the wind was blowing are found to have no ice loading.

Mr. Butell, who helped make the tests, said that they figured out beforehand what would happen when the ice dropped from the wires, and the tests checked up closely.

F. D. Nims, of Vancouver, said that the trouble on the Western Canada Power Company's lines was principally when the ice dropped from the wires, and that frequently the wires sagged down to within six feet of ground.

A. A. Miller, of Seattle, inquired of Mr. Nims how many insulators were deflected under these conditions. He replied that usually only one insulator was deflected.

R. F. Hayward, of Vancouver, pointed out that the rigid pin-type insulator with the wires arranged in different planes did not give them the same amount of trouble from wind and ice as the more recent suspension type. He thought the suspension type should not be assumed to be the future insulator, as a better rigid insulator might yet be devised.

A. H. Babcock, of the Southern Pacific Railway, discussed various arrangements of wires to solve the difficulty. Mr. Hayward, however, thought the arrangement not so important as the method of suspension.

W. H. Fraser, of the General Electric Company, asked if wires slipped through clamps or if poles bent under the strain, to which Mr. Uhden replied that there was no slipping and that supports remained rigid. Wires were put in a horizontal plane to avoid trouble from sagging.

B. T. McCormick, of Montreal, said his practice was to dead-end every six or seven poles, and that he found the rigid support was better than the suspension type, especially in short lines not over 60,000 volts, as repairs were more easily made.

Mr. Hayward states that in California, where pin-type insulators were used on a 75,000-volt line, from 600 to 800 were lost in a year, and that they were changing to the suspension type, as it is easier to get a big factor of safety.

Mr. Miller spoke of a trip through Montana on which he found a 110,000-volt system with about 40,000 suspension insulators which had operated three years with only one case of failure.

Mr. Nims said that Pierson Engineering Corporation were working on an insulator which would be a happy medium between the two types. He said the trouble from ice loading on their lines was confined to long-span and suspension-insulator construction.

Mr. Fisken believed there would be less trouble with the suspension type if the spans were not made too long, and higher towers and steel-core conductors were used.

V. Karapetoff, of Cornell University, said he got different versions of the troubled situation from different men in the same companies out here. He was of the opinion that they do not allow a sufficient factor of safety on many Western systems, and brought out the uncertainty in the exact elastic limit of copper.

Mr. Babcock did not believe that a too large factor was warranted, as in the case of the New York Central Electrification. He thought the most should be obtained for the dollar.

A. M. Hunt, of San Francisco, said that most of the trouble in his experience was due to outside trouble, such as blasting, etc., which a large factor of safety would not help.

Ralph W. Pope, honorary secretary of the Institute, said that our transmission systems were in a process of evolution, and that those of us who are progressive look closely into the factor of safety.

F. L. Hutchinson, secretary of the Institute, expressed appreciation of the work of the Papers Committee, and emphasized the rapid growth in importance of the Pacific Coast Conventions.

The Wednesday morning session opened with a paper by A. H. Babcock, entitled "Mountain Railway Electrification." The author stated that his intention was simply to present facts as he had found them, and allow conclusions to be deduced therefrom. Investigations had been under way since the Sierra Nevada electrification by the Southern Pacific Railroad, but this was the first paper he had been allowed to publish.

Mountain Railway Electrification.

The paper is a study of the relative merits of steam and electric equipment for a mountain division of the Southern Pacific Railroad over the Tehachapi Pass. The two slopes to the summit of this division are 49.5 and 18.3 miles long, respectively, with average grades of 1.44 and 1.33 per cent, and ruling grades of 2.2 per cent on each slope. Assumption is made of a 2400-volt, third-rail system using 100-ton electric locomotives capable of handling train units of 500 tons for freight, and 150-ton locomotives for passenger service. On the basis of present traffic it is shown that electrification of this division would not be justified from a financial viewpoint, whether the power was generated or purchased. Appendices are given dealing with details of sub-station spacing, generating station, transmission line, block signals, shops, electric locomotives, steam-locomotive credits, maintenance of way, locomotive repairs, wages, tunnel clearances, and tonnage.

F. E. Geibel, of San Francisco, explained his method of substation spacing as given in Appendix A of the paper, of which he was the originator.

G. W. Welsh explained how curves of the load diagram were obtained from the train diagram, and the method of obtaining load-factor. Mr. Welsh also assisted in preparing the paper.

Mr. Miller, of Seattle, spoke on the unique method of calculating fuel in Appendix K, pointing out the accuracy of this method as compared with the more laborious method of integrating curves.

Mr. Fisken, thought the cost per unit of plant equipment and many of the fixed charges would be decreased considerably if they would electrify 200 or 300 miles of track instead of only 60 or 70 miles of the heavy-duty section through the mountains, and asked Mr. Babcock if under such conditions the results would not be entirely different.

Mr. Babcock stated that this was too large a problem to give an opinion on off-hand.

H. W. Beecher, of Seattle, spoke on the effect of power-plant operation, stating that with good equipment for oil as

fuel, it would be possible to get 225 to 235 kilowatt-hours per barrel of oil with a good load-factor.

P. Lebenbaum, of Portland, said that he had had some experience in analyzing reports of power companies on the electrification of certain branches of railroads, and his conclusions had been similar to Mr. Babcock's.

Professor Karapetoff complimented Mr. Babcock on the thoroughness of the paper.

Wednesday noon the Convention Committee met at luncheon and discussed the place of holding the next year's Pacific Coast convention. It was decided to recommend that it be held in Spokane, and that a joint convention be held with the Northwest Electric Light & Power Association if possible.

At the afternoon session L. P. Crim read the paper entitled "The Gulf of Georgia Submarine Telephone Cable," by E. P. La Belle and L. P. Crim.

The Gulf of Georgia Submarine Telephone Cable.

The paper describes the submarine telephone cable recently laid between Point Grey and Nanaimo, on Vancouver Island, 52.5 kilometers in length. It is continuously loaded, being the first cable of this type in use in America. The construction of the cable is described and illustrated and also the method of laying it. A careful study was made of the relative advantages of a continuously loaded and coil-loaded cable for the conditions obtaining in this case, and the results have amply justified the selection of the continuously loaded type.

R. W. Pope spoke on the early history of the trans-Atlantic Cables, giving some interesting information on the difficulties ecountered.

Prof. Karopetoff gave a talk on the paper in general, and criticized the paper in that it did not give proper references to the literature.

On Wednesday evening there was an entertainment at the Progress Club.

The complimentary piano recital given by Professor Karapetoff included several very artistic classical pieces and was greatly appreciated by the guests. He gave a short talk before rendering each selection, telling about the author and describing the picture portrayed by the music. Mr. Lighthipe, in a few words of introduction, said that Professor Karapetoff showed that he was adept in the higher harmonics of music as well as of alternating currents.

A. H. Halloran, of San Francisco, gave an interesting lecture on the electrical engineering features of the Panama Pacific Exposition, illustrating it with lantern slides. He went into some detail, giving the electrical equipment and installation features of the distribution system. Fiber conduits will be laid in trenches and wooden manholes installed. The maximum load at peak hours will be about 11,000 kilowatts, giving some idea of the elaborate illumination features of this exposition.

After several more entertaining selections on the piano, by Professor Karapetoff, refreshments were served.

On Thursday morning a paper entitled "A Modern Substation in the Coeur d'Alene Mining District" was presented by J. B. Fisken, of Spokane.

Substation in Mining District.

The paper describes a typical mine substation built by the Washington Water Power Company for supplying three-phase power at 2300 volts to the Bunker Hill and Sullivan mine. The substation building is of structural steel which has been adopted in preference to brick on account of the ease with which it may be taken down and reconstructed as the development of the mine may require. The paper gives a detailed account of all the equipment of the substation and includes the total construction cost of the substation, the cost per kilovolt-ampere capacity, and the annual operating cost. The connected load of motors at the mine is approximately 3000 horsepower. A table of distribution of cost of electric power and light for the average month is given, which shows the cost of this service for different mine operations. Electrolytic lightning arresters are installed inside and provided with electric heaters, as the building itself is not heated. The horn gaps are outside. The primary voltage is 60,000. The transformers are water-cooled, and in case the water supply fails, a "water relay" trips an oil switch, opening the circuit. The substation is automatic, and is visited daily by a patrolman for inspection and changing charts of recording instruments.

The second paper, entitled "Notes on Oil Circuit-Breakers for Large Powers and High Potentials," by K. C. Randall, was presented by A. A. Miller, of Seattle.

Oil Circuit-Breakers.

The paper gives a brief outline of some of the important developments in oil circuit-breakers which have taken place within the last two or three years. Ideal conditions require that the current should not re-establish itself after passing the first zero value following the opening of the contacts, and this emphasizes the value of high opening speed in a circuit-breaker. Breakers have been designed in which resistances were introduced to limit the current to a value readily ruptured, but as this principle is difficult of accomplishment, reactance has been successfully substituted for resistance. Reactance breakers have two sets of contacts, the main set which carries the normal current, and an auxiliary set which carries the reduced current after the reactance has been introduced by the opening of the main contacts. Breakers for any power and voltage, with all the usual methods of operation, are now available.

A. M. Hunt, in discussing Mr. Fisken's paper, suggested using a portable substation on a flat car, which could be taken to the mining districts for temporary business.

F. D. Nims inquired as to the maximum capacity to which the automatic idea could be carried. His opinion was that the water relay was very ingenious, but the automatic idea had been carried too far, leaving nothing for the man who visited the station daily.

W. H. Fraser, of Vancouver, inquired regarding the charging of the lightning arresters.

C. F. Terrell, of Seattle, questioned the applicability of water-cooled transformers to this service.

L. G. Robinson, of Vancouver, said that the improvement of automatic substations appealed to him as a feature of betterment for electrification of railroads, by helping to lower the first cost and operating expense. Faulty circuits can be taken care of by the main station operator if he uses judgment in switching out lines.

James A. Lighthipe told of a portable substation truck which they use in California, driving it out over the country for temporary work while repairing burned-out transformers.

Mr. Miller described the automatic substation in Detroit, where rotating machinery was installed, and predicted increased favor for such installations in the future.

Ralph W. Pope drew an analogy to the development of automatic telephone and automatic block-signalling systems on railroads.

R. F. Hayward said the high cost of labor in the West made the automatic station very important. The fact that the exacting service at the mines has been handled successfully by the automatic substation makes it apparent that the less rigid requirements of railroad service can be easily met, and hence the cost of electrification reduced thereby. He believed that the distribution system and substation wiring should be made as simple as possible to cut down costs.

Professor Karapetoff discussed delta and star connections of transformers and asked for information from those who had experience with both.

Mr. Fisken said the portable substation on a flat car would not work out very well in some mining districts, and also said that the three-phase transformer was much more easily handled in rough mountainous country than three single units. His company has used the three-phase units for ten years and found them economical in every way. He did not think there was any limit to the automatic idea in such installations if carefully worked out. A description was given of the flexibility of the system near Spokane. Lightning arresters are charged daily by patrolman. He did not think water-cooled transformers advisable for this service unless water could be supplied to run through by gravity. Telephone transformers are used on the most of their lines. He said that since the Washington Water Power Company had gone into the mining districts there had

not been any steam equipment installed.

Mr. Pope started the discussion on Mr. Randall's paper, saying that this was a manufacturer's paper and they should not spare any criticisms.

After adjournment for lunch, Mr. Robinson talked on switches in general and especially the abrupt opening of alternating-current lines, showing the difficulty of abruptly starting and stopping the moving heavy parts of large breakers. He advocated the use of several opening points in series to reduce the voltage and arcing at each point.

John B. Fisken asked if opening the main contact necessitated opening of reactance contact, and inquired as to the effect on an oscillograph record of introducing reactance in series with the line.

W. W. Fraser told of the switches at Niagara, and emphasized the importance of considering the capacity behind the switch in selecting the type.

C. F. Terrell believed the reactance type of breaker would solve the problem of opening heavy short-circuits on large systems.

Professor Karapetoff said that the reactance breaker was new and untried to a large extent, and he was not sure of its value yet. He also passed criticisms on the form of the paper.

A. H. Babcock considered the paper a little incomplete.

Mr. Miller said he was not an oil-switch expert himself, and Mr. Randall had not given him any further information than that in the paper.

Professor Karapetoff spoke of a new system of opening circuits by superimposing a high-frequency wave upon the wave of fundamental frequency, thus producing a great many more zero points at which the arc might be broken.

A paper entitled "Logging by Electricity," by E. J. Barry, was read by W. E. Herring, of Seattle, who gave a few introductory remarks, stating that the company referrred to was east of the mountains where the timber was smaller than on the west side. He described a tree-cutting motor weighing only about 85 pounds and said that the fact that the logging company had its refuse to burn was the only thing that made it hard for power companies, to get their business and supply power. The ordinary mill load-factor is about 20 per cent. Lumber grades are uniformly higher from an electrically driven mill than from steam drive. It is hard to give definite rates, each mill being a special case to the power company. The fire risk is the big point of advantage with electric drive. If a good rate can be given he believed steam drive would eventually be prohibited by the government to prevent forest fires. He gave a number of figures on costs. A test on a mill at Everett, Wash., showed a load-factor of nearly 20 per cent running 10 hours per day.

Logging by Electricity.

The paper describes the electric logging engines installed in a timber district in Idaho, and gives the results of tests of these machines. The carrier system is known as the "skyline" system, which is especially adapted to steep hillsides, and as the logs are carried with only one end trailing on the ground, rock and gravel do not become embedded in the bark, thus avoiding disastrous results to the saws in the mill. The estimated saving of the electric over steam operation for this installation is at least 50 cents per 1000 log-feet, and the electric drive also embraces collateral many advantages which are enumerated.

E. F. Whitney, of Portland, gave some statistics of the Oregon conservation commission report showing that one-third of the timber in this country was in Oregon and Washington; and that a large number of electric logging outfits were in operation. He went into detail on the size of steam equipment and its cost compared with electric and showed various advantages of the latter. The Portland Lumber Company averaged $21.39 operating costs per day for a donkey handling 1,600 feet.

Mr. Babcock inquired about scaling trees.

Mr. Herring said to take the diameter in inches less 2 and square it, for a 16-foot log, and get contents in board-feet. He discussed the amount of timber that could be handled by a donkey engine.

Mr. Hayward said that most of the small mills, box factories, etc., took power readily, but the big mills held off as yet.

Professor Karapetoff described a rapidly moving steel wire which was used for felling trees in Germany, and Mr. Hayward said that this method would be practical here.

Mr. Whitney described several tree-felling devices which were not satisfactory. A device is required which can be carried through underbrush, over logs, etc.

On Thursday at 8:30 p. m. a banquet was given by the local members to the visitors at the Terminal City Club. Over 80 attended, and everyone entered into the spirit of the evening. Toasts were drunk to the King of Great Britain and the President of the United States, with music appropriate to each. Speeches were made by Mr. Hayward, Mr. McNeill, Mayor Baxter, Mr. Sperling, Mr. Lighthipe, Mr. Babcock, Mr. Pope, Mr. Hutchinson, Mr. Halloran and others, predicting a great future for the resources of the Pacific Coast.

On Friday a trip was made to the Stave Falls plant of the Western Canada Power Company, and on Saturday a trip was made to the Lake Buntzen plant of the British Columbia Electric Railway Company.

THE PENNSYLVANIA ELECTRIC ASSOCIATION.

Sixth Annual Convention, Delaware Water Gap, Pa., September 16-18.

With an attendance considerably in excess of any previous meeting, the sixth annual convention of the Pennsylvania Electric Association, state branch of the National Electric Light Association, was held at the Water Gap House, Delaware Water Gap, Pa., September 16, 17 and 18. The final registration showed a total of 301 members and guests in attendance.

Considered in its entirety, the program, devoted almost entirely to operating questions, was timely and of exceptional interest. The features of the convention were the addresses of Joseph B. McCall, president of the National Electric Light Association, and Frederic W. Fleitz, a prominent utility attorney of Pennsylvania. The latter interestingly discussed the "Public Service Company Law," which was recently passed by the State legislature.

The convention was formally opened by a prayer lead by Karl Von Krug.

Vice-President Campbell, of Scranton then took the chair and the annual address of the president was delivered. In the course of his remarks, Mr. Rickert said that central-station business is becoming more centralized and absorption is becoming more marked because it increases stability of construction, operation, organization and capitalization. No doubt, he said, it will also increase the stability of the employee in opportunity and welfare. As the business becomes more stable the employee's position in the community will be recognized as of greater worth.

Mr. Rickert referred briefly to the work of the National Association and of the value of this work to individual companies. Referring to conditions in Pennsylvania, Mr. Rickert spoke of the recent legislation providing for a public service commission. Rulings will be made from time to time by this commission and President Rickert thought that it was the province of the Association to see that the rulings be made clear to all members.

Mr. Rickert said that since central stations are engaged in a business that must have the good will of the public, every effort should be made to gain the respect of the public for all of the employees. This can best be done by recognizing merit in the individual by fostering his sense of responsibility and thus adding to his self-respect. Company sections and state associations will help in this and member companies

should send as many men as possible to the state meetings.

In conclusion, Mr. Rickert called attention to the work of the various committees and his fellow officers. He recommended that the Program Committee select a subject and ask for competitive papers to be presented next year, a prize to be awarded to the best paper on the subject selected. He also suggested that two sessions be held each day of the convention, next year.

President Rickert then resumed the chair and called for the reports of the various standing committees. D. T. Campbell presented the report of the Executive Committee in which it was shown that four meetings were held during the year. Routine matters pertaining to convention matters were considered at each meeting.

Secretary Long then presented the report of the Treasurer, indicating a sound financial condition, the cash balance on hand being the largest in the history of the Association.

The report of the Membership Committee, presented by D. T. Campbell, showed a net gain of 228 members since last year, the total membership now being 1,367.

W. W. Cloud, of Philadelphia, then presented the report of the Lamp Committee.

This report comments upon the high-efficiency incandescent lamp, the bulb of which is filled with nitrogen. It is stated that the manufacture of these lamps will be limited to the higher amperes and high-candlepower units being especially adaptable to street series circuits of 6.6 amperes, 7.5, etc.; also in multiple lamps of much higher candlepower than heretofore obtained. The radical improvement in efficiency of this new type of lamp will not in any way disturb present lighting conditions. The improved efficiency being limited to only high-ampere lamps makes these lamps of particular value in entering fields which up to the present time have not been occupied by the incandescent lamp.

It is reported that the manufacturers will in the near future adopt a label for Mazda lamps containing only one voltage. This will make it easier for central stations to determine whether or not they are operating their lamps at the proper voltage. Tables are given showing the relation between the wattage, candlepower and life of incandescent lamps. The voltage of the lamp used, it is stated, should correspond to the average voltage over the system at the lamp sockets. If this is done, some of the lamps will necessarily have to operate a trifle above the rated voltage, while other lamps will operate a little below the rated voltage. The Committee reports that the average voltage drop due to interior wiring is a definite amount, and allowance should be made for this in order to give the consumer the best possible service.

It is the recommendation of this Committee that every central station give the problem of lamp voltage careful consideration, as it may be possible to improve the service and at the same time show a big increase of revenue.

C. W. Bettcher, of Harrison, N. J., opened the discussion, calling attention to the fact that voltage tests taken at the lamp socket show a drop of from 4 to 5 volts between the bus bar and socket. The question of having the voltage of the lamp agree with the voltage at the socket is important as upon this depends the efficiency of the lamp. In connection with the use of nitrogen gas in lamp bulbs, Mr. Bettcher said that this would apply only with lamps of very high candlepowers.

In reply to questions by A. P. Schneider, of Allentown, Thomas Sproule, of Philadelphia, F. M. Noecker, of Renovo, and others, Mr. Bettcher stated that the new lamp will be limited to 6.6 amperes. It will enter entirely new fields, so that if there is any new equipment necessary it will not drive out the old equipment. The lamp will be used in place of the present arc lamp, and will not be suitable for residences.

E. F. McCabe, of Titusville, spoke of the improvements that have been made in tungsten lamps, especially those designed for street lighting. He thought it would be difficult to displace these lamps with new ones.

O. P. Anderson, of Harrison, mentioned the advantages that will accrue from abolishing the three-voltage rating of lamps. He also called attention to the voltage drop mentioned by Mr. Bettcher and thought that central stations should allow for voltage drop in interior wiring by maintaining a higher voltage on the residence lines. Drop, of course, depends on the nature of the building and the character of the wiring. In properly wired buildings the drop is low. To emphasize the importance of this question, Mr. Anderson said that for every volt a lamp is operating under its rated voltage the central station loses 1.6 in wattage. There is a greater drop in direct-current service than in alternating-current.

H. P. Liversidge, of Philadelphia, thought that in view of the fact that companies are now transmitting over long distances at high voltages the drop in interior wiring is insignificant when compared to the drop in transmission lines.

Thomas Sproule, of Philadelphia, asked if intermittent burning affected the candlepower of a Mazda lamp; also if weather conditions affected its life. Mr. Anderson thought that the drop in candlepower depends on number of hours lamp is burned, whether continuous or intermittent. Weather conditions do not affect life.

W. W. Cloud, of Philadelphia, thought it advisable to carry average line voltage for certain zones and that lamps of the proper rating be supplied these zones.

C. W. Bears, of Wilkes-Barre, spoke of the application of incandescent lighting to coal mines. Due to the variation of voltage in mines the tungsten lamp has not been particularly satisfactory.

Mr. Anderson stated that some experimental work had been done in regard to mine lighting. The Mazda lamp is somewhat limited but in many cases has given satisfaction.

President Rickert, at this point, appointed a Nominating Committee composed of A. R. Granger, F. M. Noecker and I. G. Walborn. Also an Auditing Committee comprising Messrs. McAvoy, McCormick and Ott.

Wednesday Morning Session.

J. M. Wakeman, general manager of the Society for Electrical Development, opened the session on Wednesday morning with a brief outline of the aims and purposes of that organization. He called attention to some of the features that will be incorporated to promote a wider use of electricity. Of particular importance in this connection is a demonstration car which will be sent to various towns to illustrate the varied domestic and industrial applications of electric service. Moving-picture films will be available at a very moderate cost suitable for display by central-station companies. Mr. Wakeman referred to the facilities of the Society for instituting new-business campaigns and in this connection called attention to the work done at Toronto recently. As an indication of the possibilities for cooperative work, Mr. Wakeman pointed out that at the present time less than 20 per cent of available houses are wired for electric service.

Following Mr. Wakeman, the report of the Committee on Welfare Work was presented by Henry J. Harris, of Wilmerding. This report comments on the relationship between company and employee, and considers in detail the following questions: (1) safety of employees by the prevention of accidents and disease; (2) compensation for disability or death due to accident and to other causes; (3) service annuities; (4) saving and investment funds; (5) vocational education and (6) physical improvement.

In connection with the first question the Committee believes thoroughly in

the persistent use of printed signs bearing warnings on the subject of care and prevention. These cards should be varied and interesting and would do much to educate employees and to instill the safety habit. It is suggested that the Association arrange for the issue of a number of such placards, a full set to be sent to each company. It further recommends that all possible means should be employed to familiarize employees with fundamental rules of sanitation.

Relative to compensation, the Committee is of the opinion that the larger companies should take up definite and uniformly generous methods of compensating employees during periods of disability.

In connection with service annuities, the Committee recommends that in any plan inaugurated considerable latitude be allowed as to the age of employees at time of retirement, inasmuch as capacity for useful work varies greatly in individuals and also in classes of work an employee may have performed. An employee's usefulness may be prolonged by transferring those long in service to such lighter duties as they may be able to perform.

The report recommends the establishing and fostering of saving and investment funds and proposes a specific plan which combines the saving and investment funds and service annuity allowance. The report further calls attention to the importance of vocational education and comments on the educational systems inaugurated by some of the larger central-station companies. In conclusion, the Committee points out that it is a distinct advantage to central stations to encourage their employees in every way possible to enter into all healthy indoor and outdoor recreations as well tend to build up the physical structure and keep both body and mind in a healthy condition.

E. D. Dreyfus suggested that a committee of the Association could be appointed to gather information relative to the educational work being carried on by various central stations and recommendations made from these investigations. He referred particularly to the Chicago Central Station Institute.

Henry Harris called attention to the compulsory educational system which the New York Edison Company has inaugurated.

Mr. Dutton explained the welfare work which is being carried on by his company. One of the most encouraging features of this work is the cooperative spirit which is being manifested by the employees.

E. H. Davis stated that the Williamsport Company will soon make a practice of subjecting every employee to a physical examination. He said that inasmuch as laws will soon be passed making compensation compulsory, every effort should be made by companies to work out a feasible plan in advance of this legislation.

J. M. Wakeman called attention briefly to the conditions which existed in some of the European countries relative to employees compensation. The companies there disregarded the subject until laws fostered by labor organizations were passed working a hardship on the companies.

This action could have been forestalled by the central stations if they had given consideration to a feasible system of compensation for disability.

W. R. Kenney stated that the Connellsville company had taken advantage of the illustrated lectures prepared by the National Electric Light Association in educational and accident-prevention work.

Joseph B. McCall, president of the National Electric Light Association, was then called upon for an address by President Rickert, who complimented the Pennsylvania Section on having one of its members elected to the presidency of the National body. Mr. McCall outlined briefly the work of the N. E. L. A., complimenting the Pennsylvania Section on its loyalty and support. Referring to the early development of the industry, he said that the lessons learned from the mistakes of the past might be divided into several classes, viz., financial, operating and business promoting. The errors made in the way of hastily or unduly considered investments, capitalization, etc., are errors likely to occur in the acts of the pioneers of any industry. Financiers look with grave doubt upon the industry as capable of profitable venture, and conditions of the industry are such that practically no economical basis can be found to justify the claim that larger investments would be justified by even comparatively small profits.

Mr. McCall referred to the speech of Mr. Vanderlip delivered at Association Island recently, in which it was stated that only one out of five investors seeks public utility securities, but nevertheless bankers believe securities under governmental control are better than others. The Public Policy Committee of the National Electric Light Association in its report at the annual convention held at Washington, D. C., a number of years ago advocated regulation of public-service companies and since that time the National Association has favored the appointment of regulating commissions and done all in its power to bring about a closer relationship between the state governments, the people and the companies.

Mr. McCall said that the mistakes of engineering in the past were due to the fact that the industry was meeting absolutely new conditions almost daily. The lesson to be learned is so to manage properties as to provide a surplus which will enable the company to promptly make the replacements that improvements in efficiencies render desirable. The wonderful development of power business has practically made lighting a by-product; whereas a few years ago lighting loads were looked upon as the most important and motor loads as a by-product. The development of the business in a well rounded manner was included chiefly because there were no commercial or business-getting departments and the engineering end overshadowed.

Mr. McCall said that recent statistics show an investment in electric supply companies excluding electric railways of $2,500,000,000 which is more than the total capitalization of any one manufacturing industry in the country, excepting iron and steel. The combined capital of the central stations in the country has increased by 400 per cent during the past decade, and this has been accomplished by a 417-per-cent increase in primary horsepower of installation in generating stations. Concluding Mr. McCall referred to the great welfare work which is being carried on by the industry as a whole.

Following this address, a paper entitled "Street Lighting," by Preston S. Millar and Norman D. Macdonald, was presented by the former.

This paper points out that within recent years improvement in illuminants, multiplication of types, growing appreciation of the importance of illumination in all walks of life, scientific study of street illumination, and the enterprise of manufacturers of illuminants and appurtenances have combined to bring about a very considerable advance in practice. Among the most recent developments is the invention of the tungsten (nitrogen) lamp of high power for series and multiple lighting.

Perhaps the severest requirements in street lighting are those of the motor car driver. Driving a fast moving vehicle, he must perceive readily the large objects which are to be avoided. Usually he is not concerned with the details of such objects. He perceives them as silhouettes against the brighter street surface.

To the extent that this silhouette effect is relied upon in street illumination (and it is asserted that it is the most generally used and most important process of discernment in all classes of street lighting) it is obvious that the brightness of the street surface is the important factor in determining the ef-

fectiveness of ordinary street illumination.

In consideration of the silhouetting effect and of the importance of street surface brightness, it is apparent that for the immediate purposes of street lighting it is important to deliver as much as possible of the light upon the street surface. With this as a consideration, the horizontal illumination on the street surface is a useful measure because it contributes to a determination of the total light upon that surface and assists in arriving at the surface brightness.

Careful study of the problem from its many angles makes it apparent that the use of illuminants in street lighting is so varied that the only safe procedure is to specify the total light produced, irrespective of direction, and then, if desired, apply to such value a factor which will indicate the most useful light for any particular installation.

An important element in street illumination is glare. Glare resulting from the presence of unduly bright objects within the field of vision may have three prominent effects, respectively: 1. Ocular discomfort or injury: 2. Distraction of attention from objects of lower brightness which otherwise would be seen; 3. Reduction in visual power.

In street lighting glare is rarely encountered except from the presence of the light source near the center of the field of view. The first effect of glare, namely, discomfort or injury to the eyes, need not be considered in street lighting, since exposure is not sufficiently prolonged. The second effect, distraction of attention, cannot be measured and will have to be dismissed with a mere mention of its importance. The third effect, like the first two, depends upon local conditions. Under any given set of conditions reduction in visual power may be measured, though it is a very elusive effect and any statement of its magnitude must be qualified, being subject to large error.

There is a rapidly growing sentiment on the part of municipal engineers that fulfillment of contract in street lighting service should be proven. The practice of making periodic tests is growing and will undoubtedly continue to grow. Contracts ought to be scanned to make sure that they are being fulfilled in all particulars. New contracts about to be drafted should be safeguarded by test provisions which will assure fair and accurate results. Whether the illuminant employed be incandescent lamp or arc lamp, it has been thought desirable in some cities to have available, as a result of systematic tests, information as to the quality which the manufacturer maintains throughout the term of the contract. The central station can do no more than contract to supply the illuminant which is agreed upon and to put forth its best efforts to assure maintenance of quality of the illuminant and its proper operation. If periodic data bearing on both of these features of service are made available to both the central station and the municipality there is very little fear that controversy will arise in regard to the service.

In discussing this paper Thomas Sproule, of Philadelphia, thought that from an operating standpoint it is not possible to light a street on a candlepower basis, but while it is better to specify the total flux of light delivered by the illuminants, this term tends to confuse the layman. He asked as to the percentage of inaccuracy in street tests and as to the absorption of outer globes.

G. H. Stickney, of Harrison, N. J., pointed out that street lighting is generally the point at which disagreement between the company and the public begins. Street-lighting tests should be made by the city and company working in conjunction. He does not favor rigid specifications, pointing out that they are unfavorable to both community and company.

Replying to Mr. Sproule's question as to the accuracy of photometric street tests, Mr. Millar stated that an accuracy of two per cent is entirely possible. He added that in street-lighting specifications a full description of the illuminants should be given and separate specifications should be drawn up for gas lamps, arc lamps and incandescent lamps.

A paper entitled "Feeder Regulators," was then presented by A. D. Fishel. This paper points out that the increasing use of energy for light and power service, as well as the tendency for central-station combination, results in an increasing variety and length, as well as increased complexity in transmission and distribution systems, so that the question of steadiness in voltage supplied at distributing centers becomes of considerable importance. The various types of feeder regulators at present available were described and the operating characteristics of each explained. The paper gives data on the detail construction of automatic regulating equipment and presents suggestions for their proper installation.

H. P. Liversidge, of Philadelphia, in the discussion referred to single-phase regulators, pointing out that the floor space covered by this apparatus is an important consideration in congested stations. The question of noiseless operation is also important, especially when installed in substations located in residential districts. Mr. Fishel explained that in the new designs of regulators the vibration is not excessive. However, by effecting economies in floor space a compromise has to be made and maximum rigidity cannot be obtained, which accounts in some measure for vibration.

Wednesday Afternoon Session.

At the session on Wednesday afternoon, Frederic W. Fleitz an attorney of Harrisburg, delivered a very interesting address on features of the new public-service law which has recently been passed by the Pennsylvania legislature.

Mr. Fleitz gave a brief outline of his work for the Pennsylvania Electric Association in connection with the Utility Bill recently enacted in Pennsylvania. The whole trend of modern life, he said, is away from individualism and toward collective community action, and this is bound to increase each year until many of the services now performed by individuals will be done much better and cheaper by a utility. This development and progress of public utility service has brought up the question of monopoly, and Mr. Fleitz referred to a decision of the United States Supreme Court in which it is assumed that the public service company should be a monopoly.

There are, he said, three kinds of monopolies: (1) an artificial monopoly such as the so-called trusts, produced by men and interests acting in combination; (2) natural monopolies, companies operating as such on account of their prior occupancy of the field, and (3) legal monopolies, created by law by the granting of patents or exclusive franchises. Regulation of monopolies, particularly public-service companies, if it fulfills its duty protects the company as well as the people, as the company's interests and the interests of the public are the same. One of the most important duties of the public service commission is to consider the rate question and there are two theories commonly employed in this connection. The first is that the reasonableness of a rate depends upon the money invested in a plant, and the second is that the location and management of a company must be considered in establishing rates.

Speaking of the Pennsylvania Utility Bill and the Commissioners, Mr. Fleitz said he was satisfied that the Governor had acted wisely in the selection of the personnel and that they will prove to be reasonable, fair and impartial arbitrators between the utility and the public to the end that properly managed utilities shall prosper and the public shall participate in the benefits of that prosperity He discussed various clauses of the bill in detail, pointing out the significance of several changes made upon the advice of the

Committee of the Pennsylvania Electric Association appointed for that purpose.

Following Mr. Fleitz, a paper entitled "Rates" was presented by L. H. Conklin, of Warren. This paper, which treats of salient features to be considered in establishing an equitable system of rates, will be treated at some length in a subsequent issue.

E. H. Davis, of Williamsport, opened the discussion inquiring of Mr. Conklin how far the National Rate Research Committee has gone into the fundamentals of plant valuation. He thought it was imperative in view of the impending regulation in many states that the question of valuation be given the deepest consideration and some standardized method be applied for ascertaining the money invested in a plant. In replying, Mr. Conklin stated that the monthly bulletin of the Rate Research Committee is endeavoring to educate companies along these lines.

Messrs. Dreyfus, Schneider, Harris, Rickers and Wendell discussed this paper briefly from the standpoint of the action that it is possible for the Pennsylvania Association to take in familiarizing its members with valuation methods.

Following this discussion, R. S. Orr, of Pittsburgh, presented the report of the Special Committee on Legislation, of which he was the chairman, outlining the work which this committee did during the past year.

E. H. Davis, of Williamsport, then presented the report of the Committee on Public Utility Interconstruction.

Thursday Morning Session.

A paper by S. W. Brown and J. A. Metz entitled "Rules and Regulations for Outside Operators," was presented at the opening of the session on Thursday morning. It is pointed out in this paper that owing to the rapid growth and development of the central-station business, electric companies have not considered in the selection of employees, as carefully as they should, the character of their men. Such a condition naturally brings into the employ of any electric company an undesirable class of workmen, and in consequence thereof the result is to a degree inefficient. Such rules and safety appliances for employees as will best promote safety, efficiency and economy are discussed by the authors. Every central station should organize and equip first-aid corps and properly instruct and train their employees in this important work. Portable first-aid kits containing necessary material for accident cases should be kept at convenient points when work is being carried on where live wires are in such zone of work. The company should see that warning signs are hung around on the wires and poles wherever there can be any possible chance of the employees coming in contact with such wires. Examples of warning signs and rules and regulations for the conduction of the operating department dealing with safety measures are given in the paper. Rules are also given for trimming arc lamps, repairing damaged lines struck by lightning and reading, testing and installing meters.

A paper was then presented by Ira G. Walborn entitled "Rules and Regulations for Station Operation." This paper treats in a manner similar to the previous one the rules and regulations to be followed by employees engaged in inside operating work. In recommending these rules it is pointed out that every central station is making efforts to reduce generating costs. Besides the human element, which is of first importance, the costs of accidents are by no means small and reach such figures as warrant precautions for their prevention. It is impossible to absolutely prevent accidents, but they can be minimized. Many accidents may be avoided and their attendant costs will be saved by providing safety measures, good light, good air and comfort, and the work per man is increased by such provisions. The rules given in the paper are divided under the following classifications: (1) engine rooms and substations; (2) boiler room; (3) general rules.

The final paper of the session entitled "Economical Operation of Steam Boilers" was then presented by Thomas G. Coghlan.

This paper presents a plea for more attention to boiler-room efficiency. Today in a great many power plants you see thousands of dollars spent on switchboard instruments and other equipment, more or less important, while the boiler room is left with the same old steam gauge and that not very accurate. The boiler inspector will take it off and test it from time to time but the position it occupies in relation to the piping, it may have a column of water pressing on it of from 2 to 12 feet, making it read anywhere from 1 to 6 pounds off; in fact, in some boiler rooms you may get, perhaps, two gauges out of a dozen reading alike. The following instruments are conspicuous by their absence: draft gauges, so that the attendant can tell what is going on in the furnace, whether he has too much or too little draft, or what blast he has under the fire, or draft in the stack, all necessary for good combustion; a pyrometer showing the temperature of the gases leaving the heating surface of the boiler, a very important instrument indicating the conditions of the heating surface, external and internal, and of the tightness of the baffles. A system for collecting and analyzing samples of flue gas, CO_2 recorders or indicators that a check may be kept on the perfectness of combustion and the amount of excess air passing through the furnace kept at a minimum, so that the coal burned will not be wasted heating up all outdoors. No means provided for telling with any degree of certainty how much coal is burned, water evaporated, or ash made for any period of time. Thermometers for feed water and also for steam outlet from super-heaters and steam connections to turbines or engines, that the drop in super-heat may be checked to determine the effectiveness of the insulation of the pipe covering. This is a source of loss very often overlooked. It takes coal to super-heat steam and the heat being unnatural to the pressure is dropped at the first opportunity. All those instruments are necessary to economical and scientific operation of a power plant and we may as well try to steer a ship at sea without a compass as to run a plant as it should be run without them. If we are good guessers, we may get somewhere in either case, but it is doubtful.

Following this paper various resolutions were introduced and adopted thanking the retiring officers for the efforts they extended during the year; the manufacturers and their representatives for their moral and financial support and the various committees, authors of papers and others who contributed to the success of the present convention. The committee appointed to report on the president's address urged that new efforts be extended to increase the membership of the Association and that the various recommendations made by the president be considered by the new administration.

The Nominating Committee then presented the following candidates for office:

For president, Duncan T. Campbell, of Scranton.

For vice-president, Walter E. Long, of Philadelphia.

For secretary-treasurer, S. E. Pohe, of Bloomsburg.

For the Executive Committee, E. B. Green of Altoona, E. H. Davis of Williamsport, H. N. Muller of Pittsburgh, and W. C. Anderson of Plymouth.

These candidates were unanimously elected and the meeting adjourned.

On a ten-mile interurban railway between Elborfeld and Werdon, Germany, the fare for seated passengers is 30 cents, while for those compelled to stand it is only 17 cents. The round-trip fares are 50 and 25 cents.

The Federation of Trade Press Associations Holds Big Convention in New York City.

The annual convention of the Federation of Trade Press Associations in the United States was held at the Hotel Astor, New York, September 18, 19 and 20. This convention brought together 500 representatives of the leading technical, class and trade publications of the United States. The keynote of the convention was increased efficiency through the medium of an analysis and improvement of the service rendered by every department of the class publication. The sessions were divided into symposiums dealing with the editorial, circulation and advertising and publishing departments, led, respectively, by A. I. Findley, editor of *The Iron Age*, New York; M. C. Robbins, of the David Williams Company, New York; Hugh M. Wilson, of the McGraw Publishing Company, New York, and E. R. Shaw, of the *Practical Engineer*, Chicago. There was also a big business meeting, at which the inside stories of the methods which had made for success in the development of the McGraw Publishing Company, New York; the United Publishers' Corporation, New York; the *American Lumberman*, Chicago; the Hill Publishing Company, New York, and the Simmons-Boardman Company, New York, were related. The general sessions were ably presided over by President H. M. Swetland, of *The Automobile*, New York. Of particular interest to the electrical industry were the addresses made by J. C. McQuiston, manager of the Department of Publicity of the Westinghouse Electric & Manufacturing Company; F. R. Davis, of the advertising department of the General Electric Company, and F. J. Low, advertising manager of the H. W. Johns-Manville Company. Each of these men represent advertising expenditures and advertising knowledge of immense proportions, and they enthusiastically endorsed the attitude of the publishers in bringing to the development of class publications the highest degree of talent for the conduct of the editorial and business departments.

Several highly interesting and instructive addresses were made by H. L. Hollingworth, director of the Laboratory of Experimental Psychology, Barnard College, Columbia University, New York; Paul Terry Cherington, Graduate School of Business Administration, Harvard University; George Burton Hotchkiss, assistant professor of Business English, New York University; and Albert Frederick Wilson, of the Department of Journalism, New York University.

At an inspirational mass meeting, which was largely attended by the public, addresses were made by Frank Alvah Parsons, of the New York School of Fine and Applied Arts; Dr. Talcott Williams, director and professor of journalism, School of Journalism, Columbia University; Walter Dill Scott, professor of psychology, Northwestern University, Chicago; William H. Ingersoll, president of the New York Advertising Men's League; and Richard H. Waldo, president of the Quoin Club. At this meeting there was adopted a declaration of principles of the Business Press of America, which is reproduced herewith.

DECLARATION OF PRINCIPLES BY THE BUSINESS PRESS OF AMERICA.

The Federation of Trade Press Associations in the United States in eighth annual convention assembled at the Hotel Astor, New York, September the 19th, 1913, makes the following declaration of principles:

1. We believe the basic principle on which every trade paper should build is SERVICE—service to readers and service to advertisers, in a way to promote the welfare of the general public.

2. We believe in TRUTH as applied to the editorial, news and advertising columns.

3. We believe in the utmost frankness regarding circulation.

4. We believe the highest efficiency of the Business Press of America can be secured through CIRCULATIONS OF QUALITY rather than of Quantity—that character, and not mere numbers, should be the criterion by which the value of a publication should be judged.

5. We believe in CO-OPERATION with all those movements in the advertising, printing, publishing and merchandising fields which make for business and social betterment.

6. We believe that the best interests of manufacturers, the Business Press and consumers can be advanced through a greater interchange of facts regarding merchandise and merchandising and to this end invite co-operation by manufacturers and consumers.

7. We believe that the logical medium to carry the message of the manufacturer directly to the distributor and the user is the Business Press.

8. We believe that while many advertising campaigns may profitably employ newspapers, magazines, outdoor display, etc., no well rounded campaign seeking to interest the consumer or user is complete without the Business Press.

9. We believe in co-operating with all interests which are engaged in creative advertising work.

10. We believe that business papers can best serve their trades, industries or professions by being leaders of thought; by keeping their editorial columns independent of the counting room, unbiased and unafraid; by keeping their news columns free from paid reading notices and puffery of all kinds; by refusing to print any advertisement which is misleading or which does not measure up to the highest standards of business integrity.

Another important development of the meeting was the passage of a resolution establishing the attitude of the members of the Federation of Trade Press Associations with respect to bills for advertising. This was brought about through a discrimination shown by the principal stockholders of an insolvent manufacturing company who, in endeavoring to buy the claims against this company, favored bills for merchandise as against bills for advertising in class publications. The resolution was as follows:

WHEREAS, It has been brought to the attention of the Federation of Trade Press Associations that in a case of compromise with creditors, publishers have been offered, for undisputed advertising bills, a smaller percentage than merchandise creditors, solely because their claims were for advertising;

RESOLVED, That this Federation emphatically asserts the basic equality of just advertising claims with any others; it resents any discrimination against them as a reflection upon the value of advertising and the honorable nature of the publishing business, and urges its members to reject any propositions which may be made to settle advertising bills upon any different basis from other accounts;

RESOLVED, That, upon request of any member, a copy of this resolution be sent by the Secretary of the Federation to any concern which may show such discrimination against advertising accounts.

The convention adjourned on Saturday afternoon to meet a year hence, the place to be decided by the Executive Committee.

The following officers were elected:

President—Fred C. Porter, *National Builder, Chicago.*

Vice-President—Clyde Oswald, *American Printer*, New York.

Secretary and Treasurer—E. E. Haight, Class Journal Company, Chicago.

The capital invested in class publications in this country has been estimated at not less than $50,000,000. Of the 715 class publications of America, 241 of the leading papers are included in the membership of the Federation of Trade Press Associations in the United States. Over 75 different trades, industries and professions are represented by the Federation papers. The number of employees on the Federation papers is 5,900; the estimated yearly expenses for labor are $12,272,000; and aside from labor, the estimated gross annual expenditures for rent, ma-

terials and general expense are $15,000,000. The Federation includes the New York Trade Press Association, with 77 members; the Chicago Trade Press Association, with 89 members; the New England Trade Press Association, with 25 members; the Philadelphia Trade Press Association, with 14 members; the St. Louis Southwestern Trade Press Association, with 14 members; and 30 papers unaffiliated with local associations. The Federation represents a movement which seeks to better the conditions of trade-paper publishing, to raise the standards of trade journalism, and secure an efficiency in advertising which will enhance the power and usefullness of trade papers to manufacturers and advertising men.

At the banquet on Friday evening, a beautiful silver tea and coffee service was presented to William H. Ukers, of the *Tea and Coffee Trade Journal*, chairman of the Committee on Arrangements. Clyde Oswald, toastmaster, paid a graceful and eloquent tribute to Mr. Uker's indefatigable efforts, which had resulted in so conspicuously successful a convention.

Banquet of the Federation of Trade Press Associations, New York City, September 19.

Increased Coal Output in Indiana.

The total production of coal in Indiana in 1912 was 15,285,718 short tons, having a spot value of $17,480,546, an increase from 14,201,355 short tons, valued at $15,326,808, in 1911. The increase was 1,084,363 tons, or 7.7 per cent, in quantity and $2,153,731, or 14 per cent. in value.

Electric Copper-Smelting Furnace Tried in Arizona.

An event of much importance to mining men of the Southwest took place at Globe, Ariz., recently when the first electric smelting furnace ever put to practical use in Arizona was erected and placed in operation here by the Pittsburg Electric Furnace Company. The plant made test runs on copper ores, extracting 98 per cent of the copper content. Subsequent assays of the slag showed that only 0.035 of one per cent copper had escaped during the process.

The salient feature of the test was the fact that about 3,500 kilowatts per ton charge was required for smelting. From this may be estimated the economic practicability of the furnace. The added feature of absence of water jackets in the ensemble of the furnaces of the size of that used (15-ton capacity each 24 hours) and lightness of parts make the furnace peculiarly adaptable to carbonate deposits in high and inaccessible places, provided electric current can be supplied at a rate sufficiently low to make operation of the furnace an economical success The furnace is of the purely resistance, vertical-shaft type, six feet in height and lined with magnesite bricks. The orifice is 22 inches in diameter at the top and tapers down to 20 inches at the bottom. A stationary electrode is fixed in the bottom of the furnace. At the top a five-inch Acheson graphite electrode is suspended and operated by a winch. The heat is started by an arc and as the charge melts the upper electrode is withdrawn partially, remaining immersed in the charge just sufficiently for the resistance of the charge to the current to maintain the necessary heat. The molten bath is always kept at a height of as near three feet as possible to insure this resistance.

Near the bottom of the furnace are two spouts. The upper one is tapped every half-hour to withdraw the slag, and at the end of three hours the copper button is drawn off at the lower spout. The furnace apparently has many advantages over the ordinary blast furnace, the lack of draft obviating waste in the form of flue dust or other fine particles, and the consequent work of briquetting, the possibility of running with a higher acid content because of the greater heat and the need of only enough carbon to reduce the oxide in the ores, none being required to aid in heating the charge.

Vice-president Paul of the Copper Reef mine defrayed the expense of the test and purchased the furnace.

Variation of Magnetism of Nickel with Temperature.

The coercive force of nickel has been investigated at temperatures between minus 185 degrees and plus 339 degrees centigrade and found to vary from 29 to 3.9 gausses by R. Gans, as reported in *Physikalische Zeitschrift*.

The Austrian Government is about to erect a new testing station for electric meters and water meters at Vienna.

New Electrical and Mechanical Appliances

New Brown High-Resistance Electric Pyrometer.

For measuring the higher temperatures no form of pyrometer is believed to be so satisfactory nor so accurate as the thermoelectric pyrometer, which, as is generally known, consists of a millivoltmeter graduated in degrees of temperature and a thermocouple.

The desirability of having the resistance of the millivoltmeters comparatively high has been recognized, but it was not until recently that the art of making instruments was able to overcome the various difficulties of design and construction and produce such a millivoltmeter.

For this reason low-resistance thermoelectric pyrometers have been generally used, the resistance of the millivoltmeters measuring from two to five ohms. With this type of instrument it is absolutely essential for the instrument to be calibrated with the leads or connecting

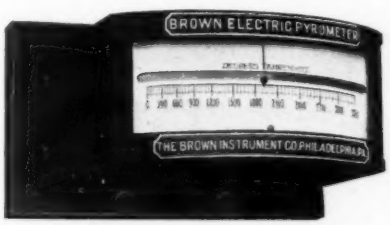


Fig. 1.—New High-Resistance Pyrometer.

wires which are to be used, and any change in the length of these leads or any change in the length of the thermocouple furnished with the instrument will alter the true indication of the pyrometer and serious errors will result. A change in the length of leads of only one to 50 feet is sufficient to make the average low-resistance pyrometer read 25 degrees or more low and a change in the length of thermocouple from 3 feet to 4 feet will make the same instrument read 20 degrees or more in error. For fairly accurate results, therefore, it is necessary to use the thermocouple and leads which are furnished with the instrument, or exact duplicates thereof.

It is true that for some time galvanometers or millivoltmeters, portable in form only and not of the switchboard or wall pattern, of high resistance, have been produced abroad. These instruments, however, are usually of the suspension type; that is, the moving element is suspended from the end of a fine wire or metal strip. Aside from supporting the moving element the suspension strip has another function and that is to restore the moving coil or element to its zero position. It, therefore, has to be comparatively long and also small in cross-section, otherwise the torsional resistance or the twisting moment would be too great and the high-resistance characteristic would not be achieved. The result is that this type of instrument is very delicate, the suspension being easily broken, which of course puts the instrument out of commission. It is also necessary before using the instrument to carefully level it, otherwise the coil will not swing freely in the magnetic field between the core and pole pieces. This type has therefore been unsuitable for general commercial conditions.

The advantages to be gained from a properly designed and constructed millivoltmeter of high resistance are very marked, however, and some of them are as follows: Any change in the length of leads connecting the thermocouple with the millivoltmeter from 1 to 1,000 feet will not change the indications of the instrument as much as five degrees, nor will any change in the temperature of these leads introduce any error in the indications of the instrument; neither will the length of thermocouple, the size of the elements forming the thermocouple nor the length of the thermocouple inserted in the heat zone change the indications of the instrument. All of these advantages are due entirely to the extremely high ratio of the resistance of the millivoltmeter in relation to the resistance of the thermocouple and leads.

The Brown Instrument Company, Philadelphia, Pa., which devotes its entire time and attention to the various problems connected with temperature measurements, has for the past two years been conducting exhaustive tests and experiments in order to design accurate high-resistance thermoelectric pyrometers. The result has been the company is now able to supply such an instrument of the pivoted type, that is, a type in which the moving element or coil is not suspended from the end of wire or metal strip but is absolutely supported by means of small hardened steel pivots in sapphire-jewel bearings. The moving coil and pole pieces of the magnet have been so changed in design as to produce a magnetic flux of great intensity in the air gap in which the coil swings. This high-resistance instrument, having a resistance of 100 ohms, can be furnished in either the indicating type or the recording type.

In Fig. 1 is shown the standard type of indicating instrument of the high-resistance type, it being customary to supply this instrument in the horizontal type as it affords a long scale for easy reading. This type of instrument has a mirror under the scale so that absolute accuracy in readings can be secured.

In Fig. 2 is shown the interior construction of the high-resistance system showing the redesigned pole pieces and small moving element, the latter having been lightened to a minimum. All the complaints heretofore experienced in pyrometers due to the question of accuracy with a certain length of leads, or to the temperature of the leads, or in the length of thermocouple, or to the

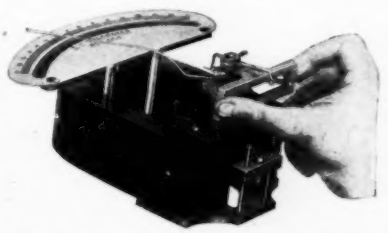


Fig. 2.—Internal Construction of Instrument.

length of thermocouple inserted in the heat, need not be considered with this new instrument. Its accuracy is naturally far greater than any thermocouple pyrometer heretofore produced and wherever accurate measurements are desired an instrument of this type will doubtless be used in the future.

The Brown Instrument Company has been able to design this system in such a manner that its cost is practically no greater than the cost of manufacturing the low-resistance instrument which permits it to put an instrument of this character on the market at a reasonable price. The instrument can be used for either base metal or platinum thermocouples as desired and it is recommended for either type of couple. The same type of system is also used in connection with the recording instrument, and it is possible now to procure Brown high-resistance indicating or recording pyrometers for either platinum or base-metal thermocouples.

Improvements in Packard Transformers.

Transformers have always been acknowledged to be the most nearly perfect of any kind of electrical apparatus. Even in the old days when nothing better than soft iron was available for core-making, efficiencies of 97 per cent were common This placed transformers as a class of electrical apparatus far ahead of their nearest competitor in the race for perfection.

The transformer industry received its greatest impetus when silicon-alloy steel replaced the old soft-iron cores. The use of this material made it possible to greatly reduce the core losses and also the copper losses by reason of the smaller cores and higher magnetic densities which became usable. It is safe to say that the advent of silicon-alloy steel has reduced the losses by 50 per cent so that an efficiency of 99 per cent is sometimes excelled in large transformers and 98 per cent is common in the ordinary sizes.

It would seem that when as close an approximation to perfection as this is reached a fraction of a per cent either way would be a matter of small importance and perhaps this is true when the entire equipment of generators, transmission lines, transformers and motors, is considered. But manufacturers and buyers are apt to consider the performance of transformers as isolated from everything else and when thus considered, a watt either way is a matter of considerable importance. To improve an article already so nearly perfect will be admitted to be a rather difficult matter and calls for the utmost attention to even the smallest details of design.

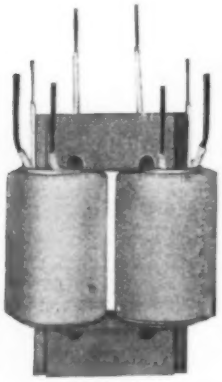


Fig. 1.—Packard Transformer Element, Showing Oil Ducts.

Fig. 2.—Top View of Transformer With Cover Removed, Showing Terminals.

Fig. 3.—Phantom View of Complete Transformer.

The Packard Electric Company, of Warren, O., has placed on the market a transformer which presents the very latest improvements in transformer design. That several real improvements have been incorporated will be evident upon reference to the following descriptive matter.

Four extra oil ducts have been provided for ventilating the interior of the transformer. The openings for these ducts are shown in the yokes in Fig. 1.

The cruciform core, which every manufacturer of core-type transformers uses, has four oil ducts on each core but two of these are ordinarily closed up by the yokes at the top and bottom. The Packard company has avoided this difficulty by giving the yokes the peculiar form shown, which makes the four inside ducts available for ventilation purposes and insures a supply of cool oil in the interior of the transformer where it is most needed. This feature alone makes it possible to operate the transformers under more severe conditions and higher overloads than the average transformer.

Besides the above, a special form of core is used which eliminates cross-magnetization. All secondary leads are brought out through a single strong porcelain bushing, which has the effect of reducing stray magnetism in the iron cases and thus improves the copper losses and regulation.

The Tele-Call System.

In large establishments, whether they be industrial or commercial, calls are frequently made for some particular executive official who may be at that particular moment visiting one of the remote departments. In order to save the time of the party calling, who may be a large customer, and also of the official desired, it has been found extremely convenient to have a system of code signals to operate either in conjunction with the private branch-exchange telephone system or as an independent system, by means of which the individual wanted can be readily located and can promptly get in communication with the person calling.

Fig. 1.—Tele-Call Adjunct to Telephone Switchboard.

Such a system is the Tele-Call system developed by the Mead Electric Signal Company, 2058 East Fourth Street, Cleveland, O. This system has

been brought to a high state of perfection and is being used in a large number of establishments with the most gratifying results. It is used for the most part in connection with the private-branch telephone exchange, becoming a valuable adjunct thereto and being conveniently controlled by the operator, as shown in Fig. 1. As there shown, the equipment is compact and consists of what is called the central station, a set of relays and gongs by means of which characteristic signals are sounded on single-stroke bells located in as many different places as may be required to make these signals audible in every department or room in the institution.

Fig. 2 shows a phantom view of the central station. This is the operating end of the system and consists of a neat metal box, usually placed convenient to the telephone-switchboard operator. It is electrically controlled direct from any alternating-current or direct-current lighting system. At the front of the box is a set of numbered levers, each one corresponding to a

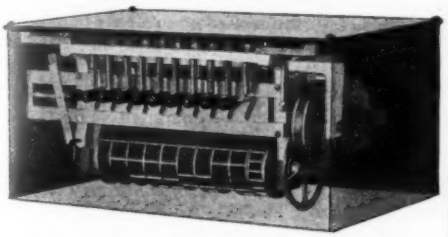


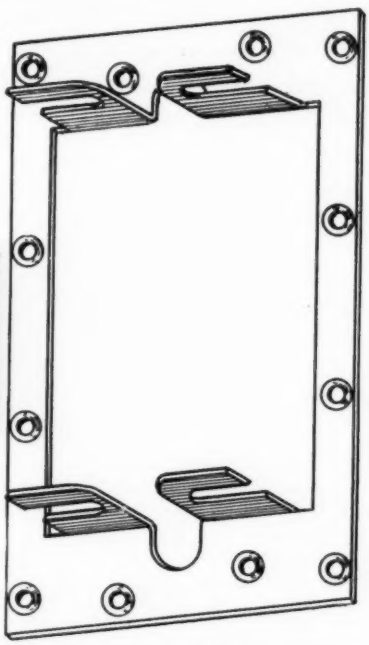
Fig. 2.—Phantom View of Tele-Call Central Station.

superintendent, foreman or other official. To send out the call for any of these individuals the operator merely depresses the corresponding lever, and by this simple operation sends out either a single call, which automatically stops when completed, or a continuously repeated signal, which is discontinued when the individual steps to the nearest telephone and answers. As soon as the call lever is depressed it becomes locked until the call is completed; all the other levers are at the same time interlocked so that two confusing signals cannot be sent out simultaneously.

The central station, so called, and the various bell circuits are connected to the lighting circuit supplying the system through simple automatic relays that can be placed along the line, thus making the system completely elastic by permitting the addition of other bells and circuits without disturbing the original installation or overloading the main line.

The gongs used in this system are arranged to give a single distinct and sharp stroke. The hammer does not remain in contact with the gong, dampening its vibrations, but is immediately released and allows the gong to vibrate freely. Each gong is adjusted by means of a small thumb-screw which permits changing the stroke from a mere tap to a powerful stroke, in each case producing a clear and distinct tone.

The equipment requires no batteries and the current it takes from the lighting circuit is so small as to be practically negligible. All parts of the equipment are simple and not easily deranged. The wiring can be easily done by any electrician or contractor. The calls used in this system are simple combinations of not more than five or six strokes; thus by various combinations of five strokes 10 different individuals can be reached by a simple code; by combinations of six strokes 15 individuals may be similarly reached. It is also possible to arrange special signals for dismissing a group or all of the employees, for fire drills, and other purposes.



Supporting Plate for Wall Switches.

Supporting Flush Plate for Wall Switches.

The illustration herewith shows a very convenient and inexpensive galvanized supporting plate made by the Flush Plate & Appliance Company, Incorporated, of Binghampton, N. Y. This supporting plate is intended for use in connection with the installation of flush push-button wall switches, both in old and new wiring work. In applying this plate to switch boxes of the Union or similar type, it is necessary merely to remove the small lugs now furnished with the box and to substitute the new plate in its place. It will be observed that the lugs in this plate have the slots for receiving the screws cut in the opposite direction from the old style of short lugs. This permits the use of this plate on any box of this general type and makes the plate practically universal. For new work the plate is used with the lugs projecting forward and in the case of old work the plate is turned so that the lugs project into the wall.

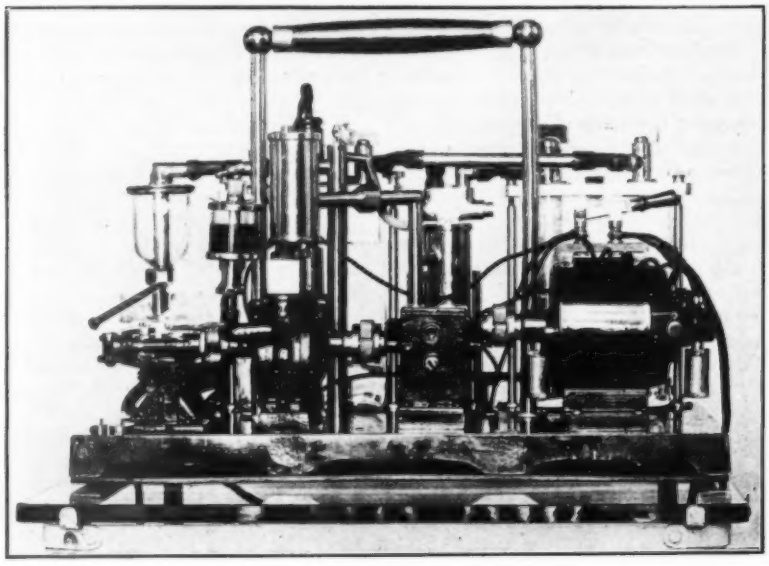
Contractors and wiring specialists who have examined this plate, have been greatly pleased with its design and expressed themselves as favorable to its use. It permits making a much neater installation and saves a great deal of time in the work. Various representatives of fire underwriters in the East on examining this plate have immediately indorsed it. The plate is patented, as are other wiring devices made by the company. Designs are now being made for similar plates adaptable to gang switches.

Mercury Switch Tube.

Hatfield Mercury Switch Tubes.

When electric currents in circuits of fairly high tension are broken between electrodes of mercury, no arc of any consequence will be produced in an atmosphere of hydrogen. This principle has been applied in the form of closed tubes containing mercury electrodes which have been utilized as switches. When made with extreme care and properly constructed they have been found very suitable for many purposes. When used on circuits, however, where considerable currrent must be switched off and on, it has been found that the glass tubes are soon broken.

A remedy for this trouble has been found by Stafford Hatfield, and consists in inserting in the glass tube a porcelain cup, on the rim of which the spark will be formed when the mercury contact is broken. A tube having this construction is shown in the accompanying illustration. These tubes are manufactured by the Ilmenauer Glasinstrumenten-Fabrik Albert Zuckschwerdt, Ilmenau i. Thueringen, Germany.



Electrically Operated Anesthesia Apparatus.

Two Big Turbo Blower Sets.

Two turbine-driven forced-draft blower sets, which are probably the largest in point of horsepower in the world, are about to be installed at the Rhode Island Company's power plant at Providence, R. I. Each unit consists of a 600-horsepower Terry steam turbine, driving, through a set of Falk reduction gears, an American Blower Company's double-inlet Sirocco blower. Each unit has a capacity of 250,000 cubic feet per minute and supplies draft to Taylor stokers. The turbines run at a speed of 3,370 revolutions per minute and the blowers at 460 revolutions per minute, the speed reduction being 7.35 to 1.

Electrically Operated Anesthesia Apparatus.

The illustration herewith shows a rather novel use for a small motor in connection with a new machine for producing anesthesia. The apparatus comprises a fractional-horsepower motor which drives a small air compressor, a glass chamber containing ether, another chamber containing water, together with a filter for purifying the air.

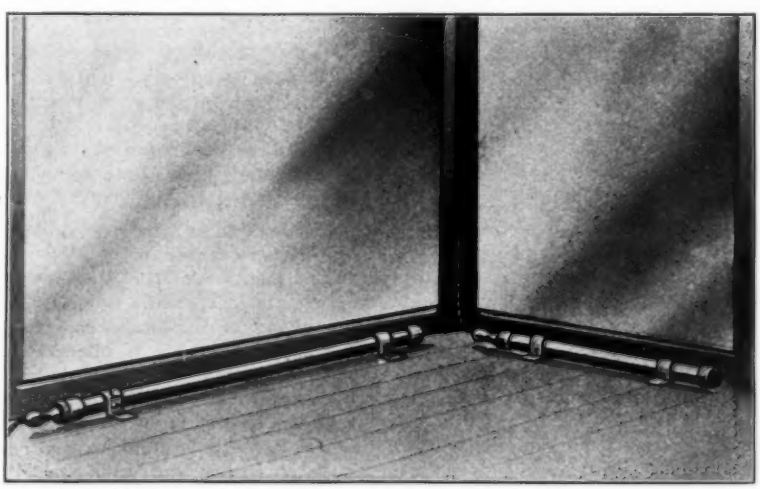
Compressed air passes from the purifying chamber through the ether and the vapor is then carried to the water chamber where it is warmed, at the same time joining air which had previously been diverted. The water is heated by an electric device attached to the switch on the motor. From the water chamber, the vapor goes through the condenser, and then through a long tube to the patient's lungs. Pressure, which is indicated by a manometer, may be regulated from nothing to eighty millimeters of mercury. A safety valve on the pipe connection will blow off if the desired pressure is exceeded. Another valve permits the anesthetist to control the vapor, increasing or decreasing the ether strength, or administering warmed air toward the end of the operation.

This apparatus is in use in large hospitals and has made it possible to perform the most extensive operations on the thorax and has greatly simplified the problem of anesthizing for other operations. The motor shown in the illustration is manufactured by the Diehl Manufacturing Company, Elizabeth, N. J.

The Moss Electric Window Heater.

Various devices are coming into use for preventing show windows from becoming "steamed," and these are likely to be of very good service. As the purpose of a show window is to give a view of goods to passers by, it is evident that should these be hid by a layer of condensed steam, the sale of the articles is sure to suffer in proportion. Therefore, any slight expense in the way of putting in an electric device for keeping windows clear is sure to be made up within a very short time. Such devices are made to heat the windows on different principles. One device uses a small electric fan motor combined with a heating coil so as to send a current of hot air upon the glass pane.

On another idea is the Moss electric window heater, which is illustrated herewith. It is of English make and is already proving quite a success. In their recent account of the device the makers say very pertinently that a dealer would not think of dressing his show window and then drawing the shades or blinds to hide the goods from view, and he also should not allow the window to become "steamed" which prevents the buying public from seeing what he has for sale, especially as the remedy is easy to apply whereever electric current is at hand. The simple, neat and effective heater shown is made up in the shape of a heating tube which can be installed in a few minutes along the bottom of each pane, and a flexible cord and plug serves to connect up to an ordinary lamp socket. Such tubes are made in any length up to eight feet, and the heater consumes a very small current. Another point is that the tube heater takes up very little room and does not interfere with the goods in the window, and it is also cheap, so that it is likely to be applied extensively when once its advantages become known. The inventor of this device is Harry Moss, 116 Horton Grange Road, Bradford, England.



Moss Electric Window Heater.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

AMBROSE, N. D.—L. G. Darling will construct an electric light plant here.

MOBILE, ALA.—The Mobile Electric Company is contemplating building an extension to one of its lines.

MOSS BEACH, CAL.—An election will be held here to decide upon a public highway and lighting district.

WILSON, N. C.—The Council may build both an electric and gas plant. Address the mayor in regard to the matter.

OAK HARBOR, O.—The village has voted to issue $20,000 municipal light bonds. Address the city clerk for particulars.

HARRISON, N. J.—The Public Service Company will install a new conduit system for its service lines in Harrison Avenue. A.

MOUNTAIN CREEK, ALA.—The Alabama Power Company, of Birmingham, will establish a hydroelectric power station here.

REDLANDS, CAL.—The residents of this place are considering seriously the proposition of establishing a municipal lighting system. T.

PALO ALTO, CAL.—An election has been called to vote on the proposition of forming the Denniston Highway Lighting District.

HOMESTEAD, FLA.—F. J. Powers has petitioned the City Council for a franchise to establish and operate an electric light plant.

SUMTER, S. C.—Liberty Holding Company has been incorported with a capital stock of $100,000 to establish light and power plants.

LOGAN, W. VA.—Logan Lighting Company has been incorporated with a capital stock of $200,000 to establish an electric light and power plant.

NEWARK, N. J.—The Whitehead & Hoag Company, manufacturers of advertising novelties, will build a new power plant to cost about $20,000. A.

MEMPHIS, TENN.—The Southern Electric Company has been incorporated with $5,000 capital stock by John B. Vesey, G. S. Scruggs and others. G.

LIMA, O.—The Commercial Club is discussing ways and means to establish a boulevard cluster-lighting system. Address President Askin for information.

TRENTON, N. J.—The Board of City Commissioners has arranged for the installation of an ornamental street-lighting system in Parkside Avenue in this city. A.

CLINTWOOD, VA.—Harman H. Mullins is planning the installation of an electric light plant. John Mullins is associated with his father in the promotion of this project. G.

BROWNWOOD, TEX.—The city council has appointed a special committee to investigate the proposition of constructing a municipal electric light plant here. D.

TRENTON, N. J.—The New Jersey State Hospital for the Insane has had plans approved by the State authorities for the erection of a new central power plant. A.

SPOKANE, WASH.—Commissioner of Public Utilities C. M. Fassett has secured permission from the City Commissioners to install street lamps in several streets.

RICHMOND, VA.—Electric Properties Corporation has been incorporated with a capital stock of $8,000,000 to establish and operate light and power plants.

MARSHALLTOWN, IOWA.—The Council and County Commissioners will light the public square with electroliers. Address City Attorney Northup for information.

BAKER CITY, ORE.—The City Council has passed an ordinance ordering the sale of $25,000 in bonds for the erection of the proposed municipal lighting plant.

GALLUP, N. M.—The question of granting an electric-lighting franchise in this place to the People's Light & Power Company will be submitted to a popular vote on October 7.

BENTON, TENN.—Benton is to be lighted with electricity in the near future. The new transmission line running to Maryville will carry electric power to this place.

MENASHA, WIS.—The Menasha City Council has decided to order another 225-horsepower engine to furnish additional power for its electrical plant. Address the city clerk.

DAWSON SPRINGS, KY.—The New Century Hotel Company will install an electric light plant costing $7,500. F. M. Fisher, Paducah, is president of the company. G.

ST. CATHARINES, ONT.—The Hydro-Electric Commission has agreed to install a $90,000 plant to supply power and light. The ratepayers will vote upon a by-law soon.

GLEN GARDNER, N. J.—The State Department of Charities and Corrections has approved plans for the erection of a new power plant at the Glen Gardner State Sanatorium. A.

BLOOMINGTON, TEX.—Preparations are being made here for the construction of a water works system and an electric light plant. The Commercial Club is promoting the projects. D.

JEFFERSON CITY, MO.—R. L. Baldwin, an engineer of Kansas City, has been employed by the Jefferson City authorities to draw preliminary plans for a municipally owned lighting plant.

PERRYVILLE, KY.—W. J. Debaun is planning to begin at once the work of doubling the capacity of his electric light and ice plant, the improvements of which he has been considering for some time. G.

COEUR D'ALENE, IDAHO.—At a special meeting of the City Council recently it was decided to ascertain immediately at what figures a municipal light and water plant could be constructed. O.

FORT BRANCH, IND.—Electric Light Company of Fort Branch has been incorporated with a capital stock of $20,000. Walter C. Palk, Homer T. Genung and William A. Polk are the incorporators.

PLACENTIA, CAL.—At an election held in this city the residents voted by a large majority to establish a street lighting system in this city. The Board of Supervisors of Orange County will manage this lighting district. T.

WARRENTON, ORE.—At the last meeting of the City Trustees applications for lighting and power franchises in this city were made by the Seaside Light & Power Company and the Pacific Light & Power Company.

KALAMAZOO, MICH.—Final details of the ornamental lighting system to be installed in the business district have been gone over by W. O. Jones, Dr. W. E. Upjohn, Samuel Falz, and Consulting Engineer Rutz.

VALE, ORE.—The Beaver River Power Company, of Boise, Idaho, plans the building of a high-tension transmission line into this city. Construction crews have been ordered to start the proposed improvement. O.

JAMESTOWN, N. Y.—The voters of this city at a recent election decided on a bond issue of $40,000 for the purpose of improving and enlarging the municipal electric lighting plant. A 1,000-kilowatt steam turbine will be added.

ALEXANDER, N. D.—The committee appointed to visit other towns and investigate electric light plants reported that the original plants for Alexander were not large enough and recommended a larger engine and plant.

NEW RICHMOND, IND.—Montgomery Light & Power Company has been incorporated with a capital of $24,000. The directors are O. W. Mason, Charles Haywood, R. N. Carding, H. C. Shobe, A. S. Fraley, J. C. Wingate.

JACKSON, MISS.—The Board of Trade, the management of the state fair and business men generally have held a conference with the electric light people, and it has been agreed that Capitol Street must be made a great "White Way."

JEFFERSONVILLE, IND.—The City Council is negotiating with merchants of the city regarding the establishment of a "White Way" on Spring Street and Court Avenue. The business men have agreed to pay part of the cost of maintenance. G.

PORTLAND, ORE.—Bids will be re-

ceived by the Commissioner of Public Utilities until October 6 for lighting for a period of three years from January 1, 1914, the streets, public grounds and all other municipal properties lighted by incandescent lamps.

GARNETT, KANS.—The City Commissioners have issued a call for a special election to be held October 14 to vote $15,000 bonds to build an electric light plant for the city or buy the plant owned by J. W. McAffe, and $8,000 bonds to improve the waterworks.

WEST READING, PA.—Work will be started in the near future on the erection of a transmission line from the Metropolitan Electric Company's plant here to Lebanon. The estimated cost will be about $150,000. Clarence C. Long is electrical engineer.

ALBANY, N. Y.—Articles of incorporation of the Tri-County Electric Company, capitalized at $25,000 has been filed with the Secretary of State. The directors are Thomas F. Barrett and George H. Conkey, of Utica, and E. G. Morris, of Whitesboro.

LOS ANGELES, CAL.—The Council of this city has decided to advertise for bids for street lighting, these contracts, when let, to run for a period of two years. A provision is placed in the call for bids that during the year 1914 550 new street lamps shall be installed. T.

BELLINGHAM, WASH.—Puget Sound Traction, Light & Power Company is making arrangements to serve farmers living near the Skagit-Bellingham interurban with electricity for light and power, and will commence extending transmission lines for that purpose in the immediate future. O.

PORT MOODY, B. C.—One of the most modern lumber mills yet erected in the Province, it is reported, will be shortly built here by the Vancouver Timber & Trading Company, of Vancouver. The estimated cost is $300,000, and the annual output 60,000,000 feet. The mill is to be electrically operated.

WELSH, LA.—The special election held here for the purpose of voting on $15,000 for the erection of an electric light plant resulted in an overwhelming victory for the tax. The bonds will immediately be sold to local capitalists and work will begin at once. It is proposed to start the plant about Christmas.

ALMIRA, WASH.—M. C. Osborne, commercial agent of the Washington Water Power Company, in writing to Mayor Irwin of this city, advises that franchises and rights of way for construction of a 60,000-volt transmission line have been secured, and crews will be set to work at once erecting a transmission line. O.

SPRINGFIELD, W. VA.—The Magnolia Power Company proposes to construct a hydroelectric plant, developing 13,000 horsepower, on the south branch of the Potomac, near here. The cost will be $1,000,000. It is proposed to transmit electricity to Cumberland, Springfield and Romney and points in West Virginia.

CALUMET, MICH.—The Houghton County Traction Company and Houghton County Electric Light Company are centralizing their power plants and substations here. It is the plan to practically double the capacity of the power station, the plant to serve both the traction and electric light companies.

BIDDEFORD, ME.—The largest power plant in York County is to be built by the Pepperell Manufacturing Company at Union Falls on the Saco River. The plans call for a concrete dam seventy feet high and the development of 10,000 horsepower. The estimated cost for a plant to develop 10,000 horsepower is placed at $1,000,000.

TAMPICO, MEX.—The Standard Oil Company is preparing for the erection of a large oil refinery at a point on the Panuco River about six miles below Tampico. It is stated that more than $2,000,000 will be invested in the plant. The company will erect its own electric light and power plant, water works system and lay out a model town for its employees. D.

VISALIA, CAL.—Actual work on the Tuolumne Light & Power Company's 400-foot dam for hydroelectrical purposes is to be rushed during the coming few months. The original survey of the project was made in the summer of 1908. The Tuolumne project draws its water from the Tuolumne River, 70 miles east of Sonora. Water is also brought from the Yosemite National park. T.

PORTLAND, ORE.—The East Side Business Men's Club favors the city owning and operating an electric lighting plant, and Dan Kelleher and M. O. Collins have been appointed to act on a committee to investigate the matter. It is planned to start a campaign through the Improvement Club and civic organizations during the next few months to further the electric lighting-plant proposition. O.

NIAGARA FALLS, N. Y.—A final report on the cost and installation of an electric lighting plant to compete with that of the Buffalo & Niagara Falls Electric Light & Power Company has been received by the Business Men's Association. The report was prepared by August B. Sweet, electrical engineer of Utica. He says a plant such as would be required could be erected for $65,000.

SOUTH VANCOUVER, B. C.—The City Council recently passed an opinion that the establishment of a municipal electric lighting plant is a pressing necessity and Municipal Electrician Rawden reports that one could be established for $600,000. He also recommends a two-unit steam-generating plant of the turbo-generator-unit type. Consideration is also being given for an adequate street lighting system. O.

DUBLIN, TEX.—The Dublin Gas & Electric Company will construct an electric-power transmission line from Dublin to Hamilton. The company is also constructing a power transmission line from Dublin to Hico, a distance of 22 miles. In addition to these two lines it will erect a new central power station for the purpose of providing additional power for other lines they have in contemplation. D.

VALLEY FORGE, PA.—It is stated that a charter will be applied for by the Valley Forge Electric Light & Power Company, for which legal papers are being prepared. Thomas E. O'Connell, V. N. Shaffer, I. E. Miller, H. D. White and M. F. Hackett are those named as incorporators. The character and object of the company is to manufacture and sell electric light, heat and power to railroads, railways, manufacturing plants, municipalities and individuals.

EAGLE PASS, TEX.—The International Electric Company has entered into contracts with the Rio Grand Valley Land Company and the Indio Cattle Company to supply electric power for operating a number of irrigation pumping plants upon which lands which those two companies are developing. The International Electric Company will construct a system of power transmission lines to points in this section. It will enlarge its power station here at a cost of about $55,000. D.

KEANSBURG, N. J.—It is said that it is the intention of Frank Lhotta, an electrical contractor of Mount Vernon, N. Y., and George S. Bucklin, the well-known manager of the Bucklin Electrical Company of this place, who has in charge every year the electrical illuminations for the annual carnival, to get possession of Mahoras Lake, which is drained by Waackaack Creek, harness these waters and eventually supply all the northeastern section of Monmouth County with electric current.

SAN BERNARDINO, CAL.—The municipal improvement plans of Mayor J. W. Catick of this city propose that the city own its own electric lighting system, an electric street railway, etc. The municipal electric lighting proposition has been before the people of this city for the past two or three years and it is stated that a big majority of the citizens are in favor of it. Mayor Catick asks that the election of the five improvements be called before the first of January and that the amount of the issue submitted to the people be at least $300,000. T.

NORRIDGEWOCK, ME.—The Bombazee Power Company has been incorporated, capatilized at $50,000. The directors are Charles H. Hussey, G. C. Wing, William Ayer, William Brackett and Frank W. Spaulding. The purpose of this company is to buy and sell water rights and build dams, etc., along the Kennebec River. This water power is sutuated about three miles above Norridgewock and is considered one of the best water powers on the Kennebec. It is believed that something definite in regard to the development will be done soon.

PRESCOTT, ARIZ.—A syndicate of Bangor, Me., men, represented by J. Barton Nealey, has secured an option on the holdings of the Cataract Canyon Power Company and if the project is consummated it is planned to construct a large hydroelectric plant in Cataract Canyon. The proposed plant will have a capacity of about 12,000 horsepower. The water in the canyon has a drop of 1,800 feet in a distance of six miles. For that entire distance it is a continuous train of falls and rapids. From the hydroelectric plant a system of power transmission lines will be constructed. D.

COTTER, ARK.—W. V. Powell, president of the Dixie Power Company, of Cotter, reports that preliminary work has been progressing satisfactorily on the great power project. Holman & Baird, of St. Louis, hydraulic engineers, have just completed a complete survey, and pronounced the prospect one of the finest in the country. The Dixie Power Company will spend about two and a half millions in developing the project, which, it is estimated, will produce about 1,500 horsepower. It is estimated that the dam and the plant can be constructed in seven months, and the promoters hope to be able to be producing current by the fall of 1914.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

HANSTON, KANS.—Hanston Telephone Company has been incorporated with a capital stock of $5,000.

JACKSON, O.—The Conquer Hill Telephone Company has been incorporated by Thomas MacFarlane and others.

MORGAN HILL, CAL.—The City Trustees have awarded a 50-year telephone and telegraph franchise in this place to T. H. Dassel.

ARBON, IDAHO.—The Mountain States Telephone & Telegraph Company will immediately build a telephone line from Arbon to American Falls. O.

TWO HARBORS, MINN.—A telephone line will be constructed to Clarks Corners, 10 miles distant, by a new company, of which Jacob Rafin is president.

ROCK ISLAND, ILL.—The fire station will be extended and $10,000 will be spent in a police-alarm system. Address the city clerk in regard to this matter.

CLIFTON, ARIZ.—John Evans, receiver of the Duncan Telephone Company, has applied to the court for permission to extend the service of the company.

REEDLEY, CAL.—The Reedley Telephone Company will build a new building on the present site and among other improvements a new switchboard will be installed.

CAMPBELLSPORT, WIS. — East Valley Telephone Company has been incorporated with a capital stock of $20,000 by A. G. Bartlett, Bertha Bartlett and A. C. Bartlett.

ORANGE, TEX.—The Southwestern Telegraph & Telephone Company will begin the work of putting up a toll line between Orange and Newton, *via* the Orange and Northwestern railroad.

HOPE, N. J.—The Patrons' Telephone Company has made application to the Board of Public Utility Commissioners for permission to extend its lines and system in Hope Township.

DANE, WIS.—Dane Telephone Company has filed articles of incorporation, capitalized at $1,500. The incorporators named are J. B. McChesney, H. A. Koenig, P. M. Derra and W. O. Dwyer.

BRYANTSVILLE, KY.—Bryantsville Telephone Company has been granted articles of incorporation, capitalized at $3,000. R. M. Moss, N. J. Gosney and J. C. Rankin are named as the incorporators.

TRENTON, N. J.—The Board of City Commissioners has passed an ordinance granting the Western Telegraph Company permission to install underground conduits in certain streets.

MONTCLAIR, N. J.—The New York Telephone Company will enlarge its exchange station on Bloomfield Avenue and increased terminal and operating facilities will be installed. The improvement is estimated to cost about $24,000.

PORTERVILLE, CAL.—The Pacific State Telephone Company has started work on its new central station here. It is the intention of the company to install in this new home a complete new central-station equipment of the most modern type. A switchboard containing 1,000 stations will be installed. It is estimated that the plant will cost in the neighborhood of $70,000. T.

ELECTRIC RAILWAYS.

(Special Correspondence.)

TULSA, OKLA.—Charles N. Haskell is planning an extensive interurban system with headquarters at Tulsa.

GREENWOOD, S. C.—The Greenwood Merchants' Association is co-operating in a project to build a trolley line from Augusta to Greenwood by way of Edgefield.

WINDFALL, IND.—Tipton, Windfall & Marion Traction Company has been incorporated with a capital of $10,000. W. R. Bailey, C. S. Cleaver, J. F. Fulton are the incorporators.

NASHVILLE, TENN.—H. H. Mayberry, president of the Nashville-Gallatin Interurban Railroad Company, has announced that the company will shortly take up the proposition of extending the line from Gallatin to Bowling Green.

WALLA WALLA, WASH.—Repairing of all tracks that run along paved streets is to be made immediately after the Walla Walla County Fair, according to announcement made by C. S. Walters, manager of the Traction Company. The improvement will cost $10,000.

SUPERIOR, WIS.—The Interstate Transfer Railway Company has increased its capital stock from $500,000 to $1,500,000 and will make improvements. Address the secretary of Interstate Transfer Railway Company, at 207 Bank of Commerce Building for information.

DES MOINES, IOWA.—A survey is being made for the Inter-Urban Railway Company for a proposed new electric line from Des Moines to Indianola. The proposed new line will follow the Fort Des Moines street car line to the fort and then run east of the army post and south to Indianola.

ARDMORE, OKLA.—Dorsett Carter and engineer F. C. Hand of Oklahoma City have been investigating the feasibility of building an interurban from Ardmore to Cornish by way of Springer, Woodford and Oil City, a distance of 40 miles. He will submit a proposition to towns interested.

JAMESTOWN, N. Y.—The Jamestown, Chautauqua & Lake Erie railway, a steam road running from Jamestown to Lake Erie, will shortly be sold under foreclosure proceedings. It is expected that the road will be acquired by the Broadhead interests, in which event it will probably be electrified.

GRAND RAPIDS, MICH.—An electric railroad, crossing Michigan from Detroit to Grand Rapids, is a promise for the near future with work to begin next spring. H. M. Wallace of Detroit is the promoter. He claims to have obtained capital from England and Boston and to have the necessary franchises and rights of way from the limits of the two terminal cities.

HOPKINSVILLE, KY.—James Breathitt, Jr., is promoting the construction of an electric railway from Madisonville, Ky., to Nortonville, a distance of 12 miles, and proposes the purchase of the municipal lighting plant at Madisonville to be used as a power plant by the new company. He states that financing the construction work has been arranged for. G.

LOS ANGELES, CAL.—The City Council has authorized the city attorney to prepare a notice for the sale of a franchise applied for by the Pacific Electric Company for an electric railway along Maubert Avenue from Sunset and Holleywood Boulevards to the Los Feliz road. The franchise has already been recommended by the Public Utilities Commission.

HILLSDALE, MICH.—W. E. Elliott is interested in a company being organized to build and operate an electric road. The length of the road is 20 miles, but the whole project is the building of a road from Adrian to Elkhart. The Hillsdale Pioneer road is to run through Cambria and Frontier and go within a mile of Ransom. It is expected to get the work well started this fall.

LOGAN, UTAH.—Attorney Fred W. Crockett has returned from New York where he went to complete arrangements for financing the plan to build an electric railway from Alexander, Idaho, through this county to Ogden. He says that $6,000,000 will be forthcoming from French financiers as soon as bonds can be printed and sent to Paris and that the road will be constructed without delay. The enterprise embraces the erection of an 18,000-horsepower electrical plant at some point in Idaho.

REDLANDS, CAL.—The Chamber of Commerce of this place, backed by the residents, is boosting the scheme to provide a new scenic electric railway between this city and Riverside, by way of Freemont Park and John Consoli's Springs. Mr. Consoli has secured the consent of the Riverside authorities to build about five miles of the roadway between the Riverside line and High Grove, provided San Bernardino County will build about one mile and a half of road between Freemont Park and the Redlands line.

OLYMPIA, WASH.—The Washington-Oregon Corporation, with properties consisting of steam heating plant, electric plants, and railways, water systems, etc., in a large number of places recently filed with the Thurston County Auditor a mortgage in the sum of $1,000,000, $300,000 of which will be used in making extensions, improvements, etc. This company has acquired certain right of ways in the Southern part of the state and proposes ultimately to build a line from the Columbia River to Olympia and Seattle, *via* Tacoma O.

TEMPLE, TEX.—Incorporation papers will soon be filed at Austin for a $3,500,000 company which purposes to construct an interurban line between Waco and Austin *via* Temple, using the present line of the Southwestern Traction Company connecting Temple and Belton as a part of the new line. Surveys have been completed, right of way secured and other data obtained. The president of the company is A. F. Bentley of Temple, and he has associated with him many prominent business men and capitalists of Temple, Austin, Waco, Belton, Georgetown and other Texas cities, as well as representatives in the east.

OKLAHOMA CITY.—Stockholders of the Oklahoma Railway Company have authorized the issuance of bonds to the amount of $150,000 for the extension of the interurban line from Moore to Norman, bonds issued to complete the line to El Reno, and $500,000 to take up a $300,000 mortgage and to secure $200,000 worth of equipment for the company. The directors were authorized to use their own discretion as to whether bonds should be issued to extend an interurban line from Edmond to Guthrie. Vice-President John W. Shartel announced Saturday that the interurban line to Norman will be completed by October 10.

FINANCIAL NOTES.

The special meeting of Galveston-Houston Electric Company, called for October 6, is for the purpose of authorizing an increase in the capitalization of the company from $4,000,000 common and $3,000,000 preferred stock to $5,000,000 common and $4,000,000 six-per-cent preferred stock.

A. F. Bentley, president of the Southwestern Traction Company, has announced that an amendment to the charter of the corporation, increasing its capital stock to $3,500,000 will soon be filed in the Secretary of State's office at Austin, Tex. Mr. Bentley says the purpose of this proposed increase of capital is to provide for extending the line from Temple to Waco, about 30 miles, and from Temple south of Austin, about 80 miles. The financing of the proposed extensions, he says, has been accomplished in New York.

The Greenville, Spartanburg & Anderson Railway Company, the South Carolina division of the Piedmont Northern electric railway lines of James B. Duke, has authorized an increase of $2,500,000 in its capital stock. The new capital will be used in financing the new line of the company of about 50 miles between Gastonia and Spartanburg. With the completion of this link the Duke traction lines will have a through route of 205 miles between Charlotte, N. C., and Augusta, Ga.

The stockholders of the Pacific Gas Electric Company, at a special meeting, authorized the issuance of the $7,000,000 one-year, six-per-cent notes, $4,500,000 of which have already been sold to a New York syndicate. These notes were authorized by the Railroad Commission of California on August 11 last. The unsold remainder of $2,500,000 will be held in reserve, and will not be sold unless it is found necessary. These notes will be secured by $5,000,000 par value general and refunding five-per-cent bonds and $5.000,000 general lien six-per-cent bonds of the company, both of which issues have been authorized by the commission. These bonds will not be sold until conditions in the money market become normal. The proceeds of the sale of the $4,500,000 notes are being used by the company for completing the Lake Spaulding development and for other extensions demanded by the growth of its business. The number of customers being served on July 31, as reported by the company, was 331,192, a gain of 28,985, for the year ended on July 31, as compared with the preceding year.

At the special meeting of the stockholders of the Appalachian Power Company the issue of $3,000,000 five-year collateral-trust notes, secured by the deposit of $3,000,000 second-mortgage bonds, also authorized at the special meeting, and $550,000 first mortgage bonds, was approved. The notes are to provide for liquidating floating debt and to make extensions and improvements on the property, and $2,500,000 of them have been bought by William P. Bonbright & Company, Incorporated, and Jackson & Curtis. In connection with the new financing of the company a change has been made in the officers of the corporation. Robert C. Morse, of Jackson & Curtis; Ernest L. Carr, of Boston, and F. C. Walcott, of William P. Bonbright & Company, Incorporated, being placed on the Board, together with Frank L. Dame, of New York. Robert C. Moore has succeeded H. M. Byllesby as president and F. C. Walcott has been made a vice-president, with A. P. Taliaferro succeeding R. J. Graf, of Chicago, as the secretary-treasurer. H. M. Byllesby, of Chicago, is a vice-president and member of the Board as is M. A. Viele, of New York. Robert C. Scott, of Richmond, Va., also remains on the Board.

Dividends.

American Gas & Electric Company; regular quarterly of 1.5 per cent on preferred, payable November 1, and two per cent on common, payable October 1.

American Telephone & Telegraph Company; regular quarterly of two per cent, payable October 15 to stock of record September 30.

Aurora, Elgin & Chicago Railroad Company; regular quarterly of 1.5 per cent on preferred and 0.75 per cent on common, payable October 10.

Bangor Railway & Electric Company; regular quarterly of 1.75 per cent on the preferred stock, payable October 1.

Bell Telephone Company of Canada; regular quarterly of two per cent, payable October 15 to stock of record September 25.

California Electric Generating Company; a quarterly dividend of 1.5 per cent, payable October 1.

Canadian Westinghouse Company; regular quarterly of 1.75 per cent, payable October 10 to stock of record September 30.

Chicago City Railway; declared regular quarterly dividend of 2.5 per cent, payable September 30.

Cities Service Company; the regular monthly dividends of 0.5 on its preferred stock and .625 per cent on its common stock, both payable October 1 to stock of record of September 15.

Cleveland Railway Company; a quarterly dividend of 1.5 per cent, payable October 1.

Consolidated Cities Light, Power & Traction Company; regular quarterly of 0.5 per cent, payable October 1 to stock of record September 15.

Demerara Electric Company, Ltd.; quarterly of one per cent, payable October 1.

Detroit Edison Company; the regular quarterly dividend of 1.75 per cent, payable October 15 to stock of record September 30.

Duluth Edison Company; the regular quarterly dividend of 1.5 per cent on the preferred stock, payable October 1 to stock of record September 21.

Eastern Michigan Edison Company; the regular quarterly dividend of one per cent.

Electric Storage Battery Company; the regular quarterly dividends of 1 per cent on the common and preferred stocks, payable October 1 to stock of record September 22.

Electrical Securities Corporation; a quarterly preferred dividend of 1.25 per cent, and a common dividend of two per cent; the former payable November 1, and the latter October 1.

Houghton County Traction Company; regular semiannual of $3 a share on preferred and $2 on common, payable October 1 to stock of record September 17.

Indiana Lighting Company; a dividend of one per cent, payable October 1.

Interborough Rapid Transit Company; regular quarterly of 2.5 per cent, payable October 1 to stock of record September 18.

Massachusetts Lighting Companies; regular quarterly of 1.75 per cent, payable October 15 to stock of record September 25.

New England Telephone & Telegraph Company; quarterly of 1.75 per cent, payable October 15 to stock of record October 1.

Omaha & Council Bluffs Street Railway Company; regular quarterly of 1.25 per cent on preferred, payable October 1.

Ottawa Light, Heat & Power Company; regular quarterly of two per cent, payable October 1 to stock of record September 20.

Philadelphia Company; regular quarterly of 1.75 per cent on common and regular semi-annual of three per cent on preferred, payable November 1 to stock of record October 1.

Porto Rico Railways; regular quarterly dividend of 1.75 per cent on the preferred and one per cent on the common, payable October 1 to stock of record September 20.

Public Service Corporation of New Jersey: the regular quarterly dividend of 1.5 per cent, payable September 30 to stock of record September 26.

Republic Railway & Light Company; the regular quarterly dividend of 1.5 per cent on the preferred stock, payable October 15 to stock of record October 1.

Terre Haute, Indianapolis & Eastern Traction Company; regular quarterly of $1.25 a share on preferred, payable October 1.

Trinidad Electric Company, Ltd.; regular quarterly of 1.25 per cent, payable October 10.

Utilities Improvement Company; the regular monthly dividends of 0.5 per cent on its preferred stock and one-sixth of one per cent on its common stock, both payable October 1 to stock of record of September 15.

Washington Water Power Company; regular quarterly of two per cent, payable October 1 to stock of record September 15.

Western Electric Company; regular quarterly of $2 a share, payable September 30 to stock of record September 23.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Sept. 22.	Sept. 15.
American Tel. & Tel. (New York)	131⅛	131⅛
Commonwealth Edison (Chicago)	148½	148
Edison Electric Illuminating (Boston)	270	260
Electric Storage Battery common (Philadelphia)	51¼	49¼
Electric Storage Battery preferred (Philadelphia)	51¼	49¼
General Electric (New York)	147	148⅛
Kings County Electric (New York)	119	119
Manhattan Transit (New York)	1½	1½
Massachusetts Electric common (Boston)	14	14½
Massachusetts Electric preferred stamped (Boston)	68	69
National Carbon common (Chicago)	118	118
National Carbon preferred (Chicago)	113	113
New England Telephone (Boston)	145¼	146
Philadelphia Electric (Philadelphia)	23⅛	23¼
Postal Telegraph and Cables common (New York)	80	80
Postal Telegraph and Cables preferred (New York)	66½	66½
Western Union (New York)	69	68
Westinghouse common (New York)	70⅝	73⅝
Westinghouse preferred (New York)	115	115

Reports of Earnings.

DETROIT EDISON.

	1913	1912
August gross	$ 406,377	$ 312,386
Net	137,905	113,271
Surplus after charges and depreciations	38,919	20,196
Eight months' gross	3,506,793	2,740,568
Net	1,443,234	1,136,136
Surplus after charges and depreciations	662,694	379,669

PHILADELPHIA RAPID TRANSIT.

	1913	1912
August gross	$1,970,032	$1,913,094
Net	814,073	767,129
Surplus after charges.	14,118	10,028
Two months' gross	3,966,644	3,832,034
Net	1,618,154	1,529,843
Surplus after charges.	20,509	14,560

AMERICAN PUBLIC UTILITIES.

	1913	1912
July gross	$ 148,670	$ 130,078
Net	60,454	53,173
Ten months' gross	1,869,521	1,640,739
Net	843,682	719,798

The surplus after charges and preferred dividends for the ten months was $207,441.

KINGS COUNTY ELECTRIC LIGHT & POWER.

	1913	1912
August gross	$ 421,084	$ 375,821
Net after tax and depreciation	140,276	100,530
Other increase	5,711	4,392
Total increase	145,988	104,922
Surplus after charges.	74,781	30,407
Eight months' gross	3,630,223	3,365,897
Net after taxes and depreciation	1,358,312	1,192,508
Other increase	43,429	37,461
Total increase	1,401,742	1,229,969
Surplus after charges.	811,929	644,485

SAN JOAQUIN LIGHT & POWER.

The San Joaquin Light & Power Corporation reports for the year ended June 30, 1913, compares as follows:

	1913	1912
Gross earnings	$1,608,960	$1,379,912
Operating exp., Maintenance and taxes	624,179	537,700
Net income	984,781	842,211
Interest charges	359,733	339,852
Balance for stocks	625,047	502,359

Dividends on the $6,500,000 preferred stock are $390,000, leaving a balance for the common for 1913 of $235,000.

CONSOLIDATED GAS OF BALTIMORE.

The Consolidated Gas, Electric Light & Power Company, of Baltimore, has issued its annual report for the year ended June 30, 1913. The income account compares as follows:

	1913	1912
Gross increase	$6,114,973	$5,465,287
Expenses and taxes	2,963,180	2,642,887
Net earnings	3,151,793	2,822,400
Fixed charges	1,476,767	1,417,268
Surplus	*1,675,025	1,405,132
Dividends	810,673	744,750
Surplus	864,353	660,382
Reserve for depreciation	460,000	455,526
Special reserve	300,000	.....
Surplus	104,353	204,855

INTERBOROUGH-METROPOLITAN.

The annual financial statement of the Interborough-Metropolitan Company for the year ended June 30, 1913, compares as follows:

Receipts:	1913	1912
Dividends on I. R. T. stock	$4,069,536	$5,426,048
Interest, etc.	359,702	327,782
Total income	4,429,238	5,753,830
Disbursements:		
Interest on Int.-Met. bonds	3,052,125	3,052,125
Interest on six-per-cent notes	471,391	432,516
Interest on bills payable	.....	19,014
Expense account	84,321	94,995
Taxes	32,887	29,873
Total disbursements.	3,640,724	3,628,524
Surplus	788,514	2,125,307
Previous surplus	2,806,807	681,500
Total surplus	3,595,321	2,806,807

*Deficit.

PERSONAL MENTION.

MR. W. D. KYLE, general manager of the Line Material Company, of South Milwaukee, Wis., maker of outdoor tungsten fixtures, street hoods, brackets and other line material, is making an extended business trip through the East.

MR. J. E. ALDRED, president of the Consolidated Gas, Electric Light & Power Company and the Pennsylvania Water & Power Company, of Baltimore, Md., with R. M. SMITH has formed the firm of Aldred & Company to deal in securities of hydroelectric power companies and public utility corporations having an international market.

DR. CARL HERING was a visitor to Chicago last week. Contrary to his usual custom Dr. Hering did not attend the convention of the American Electrochemical Society at Denver this fall. This absence interrupts a remarkable record, as this is the first of the 24 meetings of the Society so far held which he has not attended.

MR. F. F. NASMITH, auditor of the Kentucky Public Service Company at Hopkinsville, Ky., has been transferred to Jacksonville, Fla., by the J. G. White Management Corporation, which operates the properties, and is to be succeeded by H. R. Gore, assistant auditor of the Washington, (D. C.) Railway, Light & Power Company. The change is effective October 1.

MR. D. E. FORD, of St. Louis, Mo., has accepted the position of sales manager for the American Carbon & Battery Company, East St. Louis, Ill., and will assume his new duties on October 1. Mr. Ford has for several years been manager of the telephone apparatus and specialty departments of the Wesco Supply Company, of St. Louis, and is very well known in the electrical field in which he has a host of friends.

MR. A. W. PAINE, formerly connected with the sales department of the General Electric Company, has accepted a position with the Arthur Jones Electric Company, of Chicago, as assistant manager, in charge of sales. Mr. Paine has had years of experience in the handling of electrical apparatus and will find a promising field for his endeavors in the steady growth of the business of the company with which he has become affiliated.

MR. HARRY B. LYNCH, manager of the Glendale Lighting Department and an employee of the General Electric Company, has just been appointed manager of the proposed lighting plant of Burbank, Cal. At a recent bond election the residents voted to establish this system of lights and as Mr. Lynch has been appointed manager of the Burbank Department, he will have charge of the installation of the system. An up-to-date transformer station will be installed.

MR. W. T. EDMONDSON, JR., has tendered his resignation as new-business manager of the Alliance Gas & Power Company, Alliance, O., to take effect October 1. He will become sales manager for the Southern States for the Premier Vacuum Cleaner Company and will have headquarters at Montgomery, Ala. Mr. Edmondson has been at Alliance for over a year and has done excellent work in increasing the load of the Alliance company. He was also instrumental in the formation of the Alliance Advertising Association and was its first vice-president.

OBITUARY.

MR. SETH COLLINS ADAMS, an electrical engineer connected with the Westinghouse Electric & Manufacturing Company of New York, died at his home in Rochelle Park, New Hampshire, on September 21. He was 47 years old. Mr. Adams was a graduate of Hamilton College and a member of Sigma Phi fraternity.

MR. WILLIAM W. GAMWELL, a capitalist of Pittsfield, Mass., died in Sheboygan, Wis., September 21, of apoplexy. He was owner of a controlling interest in the Sheboygan Light & Power Company and was in that city to attend a meeting of the directors. Mr. Gamwell was a native of Pittsfield and was 63 years of age. With William Stanley, the inventor, he incorporated the Stanley Electric Company which later was sold to the General Electric Company and his influence was largely responsible for the continuance of the industry in Pittsfield.

MR. CHARLES HEIDELOFF, of Hyde Park, Mass., for many years prominent in the electrical business in Boston, died on September 20 at his home at 7 Baker street. Mr. Heideloff had just returned from Germany with his family, where he had gone in hope of recovering his health. He was born in Darmstadt, May 28, 1854, the son of Alfred and Charlotte Hahn Heideloff. He came to this country when a young man and engaged in the electrical business, retiring several years ago. He was prominent as a marksman in the German Army. He was a member of the Quincy Homestead Association of Dedham. Mr. Heideloff is survived by a wife and two daughters.

MR. J. FRANK ELINE, 52 years old, of Baltimore, Md., was instantly killed when the automobile in which he was returning to Baltimore was struck by a train near York, Pa. Mr. Eline was president of the Electrical Commission, appointed by Mayor Preston, and had been in the electrical supply business in Baltimore for many years, at 208 East Baltimore Street, under the name of J. Frank Eline Company. Besides this, he was instructor of electricity at Mount St. Mary's Seminary, at Emmitsburg. Mr. Eline had been at Gettysburg and was returning home when the tragedy occurred. Mr. Eline began life under the great canvas of the cricus. In the beginning he traveled with the old wagon shows, and by turns was clown, acrobat and athlete, and was known all over the United States and parts of Mexico and Canada. When only 7 years old he is said to have run away from home to join the circus. After several years of this he became identified with a telephone concern and later accepted a position with the famous inventor of the rapid-firing gun, Sir Hiram Maxim. In the year 1880 he installed some of the first incandescent electric lamps in New York. They were placed in the window of a drug store on Broadway, and cost $6.00 apiece. Mr. Eline was a pioneer in electrical stage effects, his 24 years in that profession giving him the advantage over other electricians in that work. He was associated for 24 years with Lewis Morrison, the actor, and in 1900 was commissioned by him to design the electrical effects for several new operas. He failed in the electrical business once, but within a short time had paid every penny of his former indebtedness and resumed business.

NEW INCORPORATIONS.

LOCUST GROVE, OKLA.—Cherokee Light & Fuel Company has been incorporated, capitalized at $45,000, by E. E. Atherton and others of Tulsa.

BOSTON, MASS.—Couch & Paul Trolley Base Company has been incorporated with a capital stock of $25,000 by Lincoln A. Couch, William J. Paul and Fred M. Couch. W.

GALESBURG, ILL. — Galesburg Railway, Lighting & Power Company has been incorporated with a capital stock of $50,000. The incorporators are W. H. Carnahan, H. J. Vance and E. W. Fowler.

KANSAS CITY, MO.—Automatic Trade Control Company has been incorporated with a capital stock of $2,000,000 to manufacture and deal in mechanical and electrical devices for block signals and safety appliances.

LOS ANGELES, CAL.—Beardsley Electric Company has been incorporated with a capital stock of $100,000. The directors are L. Goldwater, M. Elasser, Morris Cohn, W. L. Moreland, C. H. Sorg, J. T. Shannon and V. S. Beardsley.

WATERVILLE, N. Y.— Tri-County Electric Company, Incorporated, has filed articles of incorporation with a capitalization of $25,000. The incorporators are E. G. Morris, Whitesboro, N. Y.; Thomas F. Barnett and George P. Conkling, of Utica.

UNION CITY, O.—The Union City Ohio Electric Company has been incorporated with a capital stock of $5,000 to engage in the business of light, heat and power. The incorporators are Charles F. Chapman, Jr., Charles McArich, Harry W. Isenberg, Newton A. Tracy and F. W. Wesley.

CHICAGO, ILL.—Johnson Electric Appliance Company has been granted articles of incorporation with a capitalization of $25,000 for the purpose of manufacturing and dealing in electrical instruments and appliances. The incorporators are Edward W. Johnson, Edward A. McGinnis and Frank Molton.

NEW PUBLICATIONS.

SUBMARINE TELEPHONY. — The article by Bela Gati on "The Improvement of Submarine Telephonic Communication by Means of Inductive Shunts" in *La Lumiere Electrique* has been reprinted and can be obtained from the author, Gyali-ut 22, Budapest, Austria.

POLYTECHNIC ENGINEER.—Vol. XIII of the *Polytechnic Engineer*, for 1913, has been published by the students of the Polytechnic Institute of Brooklyn. It contains as a frontispiece a portrait of Samuel Sheldon, professor of electrical engineering. Among the articles published are: "Oscillation Transformers," by Erich Hausmann; "Vector Diagrams of Electric Discharges," by Monroe G. Woolfson; "The Predetermination of the Voltage Regulation of Alternators," by S. K. Barrett.

TWENTY YEARS' PROGRESS.—L. B. Stillwell, consulting engineers, 100 Broadway, New York, has published a very handsome booklet describing and illustrating the important engineering works designed and supervised during the past 20 years by engineers now associated with the firm. Among the more important installations referred to is the electrical equipment of power house No. 1 of the Niagara Falls Power Company, the Manhattan Railway Company power house, New York Edison Company Waterside Station No. 1, the Fifty-ninth Street power house of the Interborough Rapid Transit Company, the Pratt Street power house of the United Railways & Electric Company of Baltimore, the electrical and mechanical equipment of the Hudson & Manhattan Railway Company, operating the tunnels under the North River between New Jersey and Manhattan Island, and the electrical equipment of the Hoosac Tunnel of the Boston & Maine Railroad.

FOREIGN TRADE OPPORTUNITIES.

(Where addresses are omitted they may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C. In applying for addresses refer to file number.)

NO. 11,677. TRAMWAY EXTENSIONS.—The municipality of Durban, South Africa, invites tenders for tramway extensions at an estimated cost of $486,550, for which a loan has been sanctioned.

NO. 11,671. TELEPHONE SYSTEMS.—An American consul in the Near East reports that two small telephone systems are now in use in his district and there is now agitation for a larger telephone system. To be prepared for emergencies, it would be well for telephone manufacturers to send catalogues to the consul in question.

NO. 11,683. X-RAY APPARATUS AND EQUIPMENT.—At a recent meeting of the advisory board of a Canadian hospital it was decided to install in the hospital a modern X-ray apparatus and the necessary electric plan in connection therewith. An American consular officer furnishes the name of the person with whom dealers in hospital appliances should communicate.

PROPOSALS.

THERMO-ELECTRIC PYROMETERS.—Sealed proposals will be received at the office of the general purchasing office, Isthmian Canal Commission, Washington, D. C., until October 8 for furnishing thermo-electric pyrometers, as per Canal Circular 800, copies of which may be obtained from the assistant purchasing officers located in any of the large cities.

PANAMA CANAL SUPPLIES.—Sealed proposals, in triplicate, will be received at the office of the General Purchasing Office of the Isthmian Canal Commission, Washington, D. C., until October 6 for furnishing motor-driven centrifugal pumps, valves, piping, hydraulic operating tables, traveling cranes, air compressor, and switchboards, complete with all electrical instruments and connections, for the Ancon and Miraflores pump stations, as per Circular 796.

ELECTRIC CONDUIT AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until October 21 for furnishing the electric conduit and wiring and interior lighting fixtures of a one-story building for the post office at Ansonia, Conn.; until October 22 of a one-story building for the post office at Le Mars, Iowa; until October 29 of a two-story building for the post office at Douglas, Wyo.; until October 31 of a one-story building for the post office at Evanston, Ill.; and until November 15 of a two-story building for the post office at Henderson, N. C., as per drawings and specifications, copies of which may be obtained from the custodians of the various sites or the office of the Supervising Architect.

ELECTRICAL EQUIPMENT.—Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until October 14 for furnishing two electrically-driven deck winches, to be delivered at the Navy Yard, Boston, Mass., as per Schedule 5,862; and for two three-motor electric traveling wall cranes, to be delivered at the Navy Yard, Brooklyn, N. Y., as per Schedule 5,878; until October 21 for furnishing one direct motor-driven grinding machine, to be delivered at the Navy Yard, Puget Sound, Wash., as per Schedule 5,864; one motor-driven spiral disk grinder, to be delivered at the Navy Yard, Norfolk, Va., as per Schedule 7,887; and one motor generator set, to be delivered at the Navy Yard, Boston, Mass., as per Schedule 5,888; until October 28 for furnishing one electrolytic, oxygen-hydrogen, generating plant, to be delivered at the Navy Yard, Mare Island, Cal., as per Schedule 5,879; one three-drum sander complete with motor, etc., and one surfacer, complete with motor, both to be delivered at the Navy Yard, Mare Island, Cal., as per Schedule 5,869 and until November 4 for furnishing 12,000 feet of three-conductor paper-insulated lead-covered cable and miscellaneous fiber conduit as per Schedule 5,871 together with one telephone switchboard, etc., and 50 common-battery telephones as per Schedule 5,872, all to be delivered at the Navy Yard Pearl Harbor, Hawaii.

DATES AHEAD.

National Association of Cotton Manufacturers. Semi-annual meeting, Hotel Chalfonte, Atlantic City, N. J., September 30-October 2.

Colorado Electrical and Industrial Exposition, Auditorium, Denver, Colo., October 4-11.

Colorado Electric Light, Power and Railway Association. Eleventh annual convention, Denver, Colo., October 6.

Colorado Electrical Club Show. Denver, Colo., October 8-15.

Kansas Gas, Water, Electric Light and Street Railway Association. Annual convention, Hutchinson, Kans., October 9-11.

American Electric Railway Association. Annual convention, Atlantic City, N. J., October 13-17.

Jovian Order. Annual Convention, Hotel Astor, New York, N. Y., October 14-16.

Railway Signal Association. Annual convention, Nashville, Tenn., October 14-17.

Telephone Pioneers of America. Annual meeting, Chicago, Ill., October 16-17.

Electrical Exposition and Motor Show of 1913. New Grand Central Palace, New York, N. Y., October 15-25.

American Mining Congress. First national mining show, Horticultural Hall, Philadelphia, Pa., October 17-25.

Association of Railway Electrical Engineers. Annual convention, Hotel La Salle, Chicago, Ill. October 20-24.

Electric Vehicle Association of America. Annual convention, Hotel La Salle, Chicago, Ill., October 27-28.

Ohio Society of Mechanical, Electrical and Steam Engineers. Annual meeting, Columbus, O., November 20-22.

With the Electrical Manufacturers

Philadelphia Storage Battery Company, Ontario & C Streets, Philadelphia, Pa., is sending out a series of blotters on which are shown various views of its thin-plate storage battery. These give a good idea of the construction of the Diamond grid plate and of the general arrangement of various types of the elements.

The Burnley Battery & Manufacturing Company, North East, Pa., has broken ground for a new factory. The building will be of modern construction and fireproof. The Burnley Battery & Manufacturing Company is the manufacturer of the Burnley soldering paste, stick and salts which are used so extensively in the electrical field for fluxing solder.

The Mead Electric Signal Company, 2058 East Fourth Street, Cleveland, O., has ready for distribution an illustrated pamphlet describing the company's Tele-Call system, which has come into extensive use in factories, department stores, large offices and banks, and similar institutions. It is a very convenient means of reaching executive officers who may be visiting any one of the many departments or rooms in such a plant.

Arthur Jones Electric Company, 223 South Clinton Street, Chicago, Ill., has just completed the furnishing and installation of a complete auxiliary steam plant for the Northern Iowa Power Company, at Humboldt, Iowa, consisting of a 250-kilowatt, 2,300-volt, three-phase, 60-cycle generator, direct-connected to an Erie City engine; switchboard; two 300-horsepower water-tube boilers; and other power-house equipment.

American Carbon & Battery Company, St. Louis, Mo., announces that on October 1 it will move its St. Louis offices to its large factory at East St. Louis, Ill. This change is made necessary on account of the great increase in orders and in order to facilitate details connected with their prompt execution. On the above date also D. E. Ford, for many years with the Wesco Supply Company, of St. Louis, will join the staff as sales manager.

American Insulated Wire & Cable Company, Twenty-first and Morgan Streets, Chicago, Ill., has published a new 32-page pamphlet dealing with its insulated and bare copper wires. The method of insulating is described in detail and the pamphlet contains numerous valuable wire tables of interest not only in connection with the company's product but for miscellaneous purposes by those making use of wire and cable.

Allgemeine Elektricitäts-Gesellschaft, Berlin, Germany, has published No. 11 of its bulletins dealing with electric-railway operation. This is a 16-page publication relating to electric block signaling for street railways and interurban lines in which single-track operation is necessary in portions of the system. The signal equipment includes special contacts alongside the trolley wire, relays and a set of green and red signal lamps. These are installed at the terminal points of the sections to be protected. The bulletin is well illustrated with wiring diagrams and views of various parts of the apparatus and gives a complete description of the system.

H. W. Johns-Manville Company, New York, N. Y., has opened a new branch office and warehouse in Galveston, Tex. The company now has three offices in Texas, viz., at Houston, Dallas and Galveston. At the latter place the branch comprises a modern brick warehouse of large proportions in which will be consolidated the stock for distribution to the other Texas offices. On account of its location and excellent shipping facilities Galveston makes an ideal concentration center. The company plans to receive at this point heavy direct shipments from New York by coastwise steamers. The increasing business being conducted with Central and South American points also makes Galveston a convenient point of distribution.

Hallett Iron Works, Chicago, Ill., manufacturer of pole-line hardware, is moving into its new factory at Harvey, Ill. The Hallett company owns 11 acres of ground and has built large and commodious shops to take care of its constantly increasing business. The new plant embraces a machine shop, the dimensions of which are 360 by 80 feet, and a galvanizing plant, 150 by 60 feet, which will enable the company to do its own galvanizing. The new plant will give the Hallett company greatly improved manufacturing and shipping facilities, which will mean better service and better prices to its customers. The plant has switch tracks on the Baltimore & Ohio and the Grand Trunk railroads. Since the company secured the services of Archibald N. Stevenson its business has been built up to unthought of proportions and this has necessitated the building of the new plant.

Record of Electrical Patents.

Issued by the United States Patent Office, September 16, 1913.

1,073,085. Covering Machine. A. Beutler, assignor to Belden Mfg. Co., Chicago, Ill. For insulating wire.

1,073,087. Make-and-Break Igniter. H. W. Bolens, Port Washington, Wis. Relates to details.

1,073,088. Wireless Apparatus for Preventing Collisions. J. Bonhomme, Nice, France. Comprises a number of stations, each having relay-influenced means to connect its antenna alternately to the transmitter and receiver.

1,073,098. Electrical Measuring Instrument. C. M. Crook, assignor to Willis Electric Meter Co., Chicago, Ill. Covers details of the damping magnet and disk.

1,073,107. Storage Battery. T. A. Edison, assignor to Edison Storage Battery Co., West Orange, N. J. Provides special connecting bars for electrically and mechanically joining the positive plates and the negative plates, also an insulated bar passing through the bottom of all plates for holding them mechanically in proper position.

1,073,113. Incandescent-Lamp Lock. J. H. A. Gardiner, Downers Grove, Ill. A clamping ring fits about the edge of the socket and the adjoining part of the bulb.

1,073,130. Signal System. A. N. Hovland, Melsomvik, Norway. Has rows of different insulating contacts forming parts of electric circuits, and a circuit-breaker and signal in each circuit.

1,073,147. Illuminating Device. J. Lafitte, Biarritz, France. An electric lamp surrounded by a globe with alternate reflecting and transparent sides is rotated on its axis.

1,073,173. Rheostat. D. P. Ruger, assignor to T. Marshall, Chicago, Ill. Two adjacent carbon-plate piles have curved adjoining contact surfaces; by rolling one pile along the other the number of plates in series is changed.

1,073,175. Fluid-Pressure Switch. J. A. Schadel, Pittsburgh, Pa. A compressed-air-actuated circuit-maker and breaker.

1,073,192. Electric Signaling Device. W. J. Warder, Jr., assignor to Adams & Westlake Co., Chicago, Ill. Has a number of incandescent lamps electromagnetically moved alternately to a given position.

1,073,200. Controlling System for Alternating-Current Machines. G. Winter and F. Eichberg, assignors to General Electric Co. Includes a primary winding, a secondary winding inductively related thereto, a transformer with its primary in series with one of the windings, a magnetizing winding connected to the transformer secondary, and means for changing the ratio of transformation.

1,073,201. Dynamo-Electric Machine. G. Winter, deceased, by O. Wolfrum, ministrator, and F. Eichberg; said Winter and Eichberg assignors to General Electric Co. An alternating-current commutator motor with brushes cooperating to form for each pair of primary poles, first a short-circuiting path along the primary field for the working current, and second a torque-producing field.

1,073,219. Process of and Apparatus for Feeding Cars into and Through Tunnel-Furnaces. A. H. Cowles, assignor to Electric Smelting & Aluminum Co., Sewaren, N. J. Operated by a thermostatically controlled electric motor.

1,073,263. Electric Vulcanizer. F. Martin, Pomona, Cal. Includes a series of resistance plates.

1,073,270. Spark Plug. J. W. Meaker, Detroit, Mich. Covers details.

1,073,281. Service - Switch Mechanism. G. E. Palmer, assignor to Palmer Electric & Mfg. Co., Boston, Mass. Includes means whereby the door when opened interposes a barrier to the main contacts and exposes the feeder contacts.

1,073,289. Electric Switch. F. J. Robinson, Lackawanna, N. Y. A knife switch with lock.

1,073,295. Combination Lock for Plug-and-Socket Fixtures. G. I. Silbert, assignor to Chi-Ill Electric Co., Chicago, Ill. The plug carries a notched ring, which is spring-locked on rotation.

1,073,303. Trolley Guard. M. Szwargulski, St. Louis, Mo. Includes flexibly mounted guard rollers above the wheel.

1,073,311. Dynamo - Electric Machine. G. Winter, deceased, by O. Wolfrum, administrator, and F. Eichberg; said Winter and Eichberg assignors to General Electric Co. A modification of No. 1,073,201.

1,073,320. Resistance Unit. W. L. Bliss, assignor to United States Light & Heating Co., New York, N. Y. Special terminal construction for an inclosed tubular resistance. (See cut.)

1,073,335. Signaling System. H. W. Doughty, assignor to G. O. Knapp, New York, N. Y. Includes a normally closed circuit with a main loop and a branch loop extending to a remote point.

1,073,336. Electrically Heating Curling-Iron. F. A. English, assignor to Birtman Electric Co., Chicago, Ill. Has a heating element in each of the two hollow jaws.

1,073,357. Operating Mechanism for Annunciating Systems. F. Michaelis, Bartlesville, Okla. Electric indicating bells are associated with a clock system.

1,073,371. Spark - Gap-Cooling Device. W. E. D. Stokes, Jr., and G. W. Davis, assignors to W. E. D. Stokes, New York, N. Y. A fixed nozzle is arranged between the terminals and has openings for directing a blast of air parallel with the spark or arc. (See cut.)

1,073,397. Controller. C. E. Cochran, assignor to Elwell-Parker Electric Co. of America, Cleveland, O. A safety attachment for a drum controller to prevent closure of the main circuit unless the controller is first put to "off" position.

1,073,417. Treated Wood for Use in Electric Storage Batteries. B. Heap, assignor to Electric Storage Battery Co., Philadelphia, Pa. A diaphragm separator deprived of constituents that deleteriously attack lead, and retaining constituents that beneficially affect the negative plates.

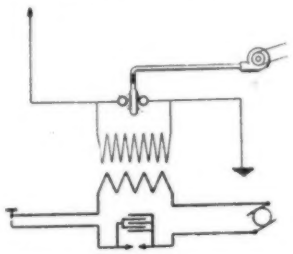
1,073,432. Process of Preparing Electrolytes for Use in the Deposition of a Metal or Metallic Alloy. P. Marino, London, England. Consists in first making an aqueous solution of a salt of the metal to be deposited, add-

1,073,320.—Resistance Terminal.

ing magnesium boro-citrate, heating, and finally adding gluco-citric acid.

1,073,436. Corneal Microscope. C. H. Pixley, assignor to F. A. Hardy & Co., Chicago, Ill. Has an electric lamp attached to one side.

1,073,439. Combined Vehicle Steering-Gear and Controlling Mechanism. F. B. Rae, assignor to Rae Electric Co., Detroit, Mich. The steering wheel and controller handle for an electric vehicle operate through concentric tubes



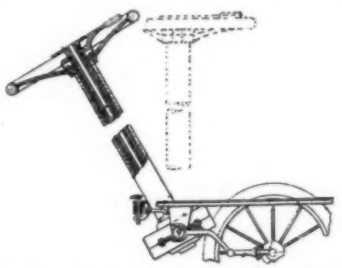
1,073,371.—Spark-Gap Cooler.

that can be swung to upright position. (See cut.)

1,073,480. Trolley. J. R. Eisaman, Latrobe, Pa. The harp member is counterbalanced.

1,073,510. Safety and Signaling Device for Railroads. D. C. Newton, Owego, N. Y., assignor of one-half to M. Lindeman. A battery-operated block-signal system.

1,073,521. Illuminated Fountain. J. H. Reichart, La Fayette, Ind. An up-



1,073,439.—Combined Steering and Electric Control Gear.

turned electric lamp and reflector constitute the central feature.

1,073,543. Electric Deposition of Metals by Fusion. A. P. Strohmenger, assignor to Slaughter & Co., Ltd., London, England. A metallic electrode is applied to the work at an angle and an arc is continuously maintained.

1,073,558. Braiding Machine. O. A. Albrecht, assignor to O. A. Albrecht Co., Omaha, Nebr. Has electromagnetically operated shuttles.

1,073,559. Electrolytic Cell. E. A. Allen and H. I. Allen, assignors to Electron Chemical Co., Portland, Me. The annode comprises parallel plates connected by cross bars.

1,073,566. Suspension Coupling for Arc Lamps. B. Bruders, Rochester, N. Y. Includes a dome, fixed contacts in it, and movable lamp contacts adapted to be raised into and lowered out of the dome.

1,073,582. Alarm System. O. B. Kaiser, Ramona, O., assignor of one-third to W. S. Ludlow and one-third to W. S. Ludlow, Jr., Cincinnati, O. An electric supervisory system with means for automatically indicating or transmitting a distinctive signal indicative of abnormal condition of each feature under supervision, and a separate signal on restoration to normal condition.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired September 22, 1913.

567,959. Process of Transforming Chemical Energy of Fuel into Electrical Energy. W. Borchers, Duisburg, Germany.

567,966. Substance for Telephone Electrodes. D. Drawbaugh, Eberly's Mill, Pa.

567,971. Electric Hand-Lighting Gas-Burner. G. J. Galbraith, Boston, Mass.

567,975. Trolley and Trolley-Support for Electric Cars. W. Grunow, Jr., Bridgeport, Conn.

567,976. Electrically Heated Smoothing Surface. W. S. Hadaway, Jr., New York, N. Y.

567,982. Automatic Device for Electric-Current Regulation. E. W. G. C. Hoffmann, Charlottenburg, Germany.

567,984. Electric Signaling Device. G. V. Knollmann, Evansville, Ind.

567,989. Electric Brake. A. F. MacDonald, Schenectady, N. Y.

567,995. Paper-Feeding Machine. R. S. Oder, Kansas City, Mo.

568,007. Electric Battery. H. C. Thomson, Boston, Mass.

568,013. Multiple Circuit-Closer for Electric Trap-Pulling Devices. T. R. Barney, San Francisco, Cal.

568,088. Apparatus for Controlling Electric Motors. H. W. Leonard, East Orange, N. J.

568,103. Telegraph Instrument. O. M. Runkle, Columbus, O.

568,142. Apparatus for Manufacturing Incandescence Electric Lamps. G. R. Lean and J. R. Massey, Cleveland, O.

568,168. Electric Car-Heater. J. G. Noyes, Milford, Conn.

568,176. Apparatus for Producing Electric Currents of High Frequency and Potential. N. Tesla, New York, N. Y.

568,177. Apparatus for Producing Ozone. N. Tesla.

568,178. Method of Regulating Apparatus for Producing Currents of High Frequency. N. Tesla.

568,179. Method of and Apparatus for Producing Currents of High Frequency. N. Tesla.

568,180. Apparatus for Producing Electrical Currents of High Frequency. N. Tesla.

568,193. Apparatus for Generating Electricity for Lighting or Heating Railroad Cars. C. E. Dressler, New York.

568,204. Electric Sign. M. Norden, New York, N. Y.

568,209. Electric Lamp for Velocipedes. A. M. Rodriguez, Brooklyn, N. Y.